Planning and Environmental Constraints Report

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Contents

Acronyms and Abbreviations

Acronym	Meaning
ACA	Architectural Conservation Area
CAFE	Cleaner Air for Europe
cACA	Candidate Architectural Conservation Area
CCA	Coastal Cell Area
C & D	Construction and Demolition
CSO	Central Statistics Office
DAFF	Department of Agriculture, Fisheries and Forestry
DART	Dublin Area Rapid Transit
DCC	Dublin City Council
DCCAE	Department of Communications, Climate Action and Environment
DECC	Department of Environment, Climate and Communications
DLR	Dún Laoghaire-Rathdown
DLRCC	Dún Laoghaire-Rathdown County Council
ED	Electoral Division
EIAR	Environmental Impact Assessment Report
EIS	Environmental Impact Statement
EMRA	Eastern and Midlands Regional Assembly
EMR	European Metal Recycling
EPA	Environmental Protection Agency
EU	European Union
GDA	Greater Dublin Area
GDATS	Greater Dublin Area Transport Strategy
GSI	Geological Survey Ireland
GWDTE	Groundwater Dependent Terrestrial Ecosystems
HA	Hydrometric Area
HEV	Historic Environment Viewer
IAPS	Invasive or Alien Species
IGI	Institute of Geologists Ireland
IPC	Integrated Pollution Control
LAP	Local Area Plan
MAC	Maritime Area Consent

Acronym	Meaning
MAP	Maritime Area Planning
MARA	Maritime Area Regulatory Authority
MMBO	Marine Map Based Objectives
NDP	National Development Plan
NHA	Natural Heritage Area
NIAH	National Inventory of Architectural Heritage
NPF	National Planning Framework
NSOs	National Strategic Outcomes
NTA	National Transport Authority
NPWS	National Parks and Wildlife Service
NWCPO	National Waste Collection Permit Office
OMPPs	Overarching Marine Planning Policies
OSI	Ordnance Survey Ireland
OPW	Office for Public Works
pNHA	Proposed Natural Heritage Area
RMP	Record of Monuments and Places
RPS	Record of Protected Structures
RPOs	Regional Policy Objectives
RSES	Regional Spatial and Economic Strategy
RSOs	Regional Strategic Outcomes
SAC	Special Area of Conservation
SCA	Seascape Character Area
SEA	Strategic Environmental Assessment
SMPPs	Sectoral Marine Planning Policies
SMR	Sites and Monuments Record
SPA	Special Protection Area
SSAO	Special Amenity Area Order
SSPO	Spatially Specific Policy Objective
TII	Transport Infrastructure Ireland
TPO	Tree Preservation Order
WCC	Wicklow County Council
WEEE	Waste Electrical and Electronic Equipment

Acronym	Meaning
WFD	Water Framework Directive
WHO	World Health Organization
WwTP	Wastewater Treatment Plan
ZoN	Zone of Notification

1 Introduction

1.1 Purpose of Report

This report provides an overview of the Constraints Study that has been undertaken for the East Coast Railway Infrastructure Protection Projects (hereafter referred to as ECRIPP). The purpose of this report is to identify all environmental and planning related constraints within each Coastal Cell Area (CCA) and their respective study areas. The information gathered in this report will be used to inform the development of options for the proposed Project. This report contains all known constraints at the time of writing, based on the available information. At the planning stage, the baseline will be updated to cover all constraints, which will be used to inform the Environmental Impact Assessment for the application.

1.2 Scheme Study Areas

There are five CCAs reviewed as part of this study. They are:

- CCA1 – Merrion Gates to Dún Laoghaire (refer to Figure 1.2.1 – CCA1);
- CCA2-3 – Dalkey Tunnel to Killiney South (refer to Figure 1.2.2 – CCA2/3);
- CCA5 – Bray Head to Greystones North Beach (refer to Figure 1.2.3 – CCA5);
- CCA6.1 – Greystones to Newcastle (refer to Figure 1.2.4 – CCA6.1); and
- CCA6.2 – Newcastle to Wicklow Harbour (refer to Figure 1.2.5 – CCA6.2).

1.3 Planning and Policy Context

1.3.1 National Plans / Policy

There are a number of national plans of relevance to the proposed Projects. These include:

- Project Ireland 2040, which is composed of:
  - National Development Plan (NDP) 2021-2030; and
  - National Planning Framework (NPF).
- Transport Climate Change Sectoral Adaptation Plan 2019
- Coastal Change Management Strategy

1.3.1.1 Project Ireland 2040

The Projects fall within the remit of Project Ireland 2040. The National Planning Framework (NPF) which was adopted in May 2018 sets out the Government's Strategic Framework to guide development and investment. The NPF pairs with the National Development Plan (NDP) to comprise Project Ireland 2040.

1.3.1.2 National Development Plan 2021 - 2030

The NDP was originally published in 2018 for the period 2018-2027 but this has been reviewed and re-published for the period 2021-2030.

The NPF and NDP outline a set of ten National Strategic Outcomes (NSO's) which are, as follows:

- NSO 1 – Compact Growth
- NSO 2 – Enhanced Regional Accessibility
- NSO 3 – Strengthened Rural Economies and Communities

NSO 4 – Sustainable Mobility
NSO 5 – A Strong Economy Supported by Enterprise, Innovation & Skills
NSO 6 – High Quality International Connectivity
NSO 7 – Enhanced Amenity & Heritage
NSO 8 – Climate Action
NSO 9 - Sustainable Management of Water & Other Environmental Resources
NSO 10 – Access to Quality Childcare, Education & Health Services

The aim of NSO 2 is to:

“ *improve transport links enhance intra-regional accessibility through improving transport links between key urban centres of population and their respective regions, as well as improving transport links between the regions themselves.*”

NSO 2 highlights the proposed Projects through the following text:

“*…over the next ten years an extensive programme of coastal protection works is planned between Dublin and Rosslare to address erosion issues in the area and improve the climate resilience of the railway.*”

1.3.1.3 National Planning Framework (NPF) 2018 - 2030

The NPF seeks to guide high level strategic planning and development for Ireland over the next 20 + years. The NPF includes a range of National Policy Objectives (NPOs) those deemed most relevant to the proposed Projects include the following:

National Policy Objective 40 “*Ensure that the strategic development requirements of Tier 1 and Tier 2 Ports, ports of regional significance and smaller harbours are addressed as part of Regional Spatial and Economic Strategies, metropolitan area and city/county development plans, to ensure the effective growth and sustainable development of the city regions and regional and rural areas.*”

National Policy Objective 41a – “*Ensure that Ireland's coastal resource is managed to sustain its physical character and environmental quality.*”

National Policy Objective 41b – “*In line with the collective aims of national policy regarding climate adaptation, to address the effects of sea level changes and coastal flooding and erosion and to support the implementation of adaptation responses in vulnerable areas.*”

1.3.1.4 Transport Climate Change Sectoral Adaptation Plan 2019

The Transport Climate Change Sectoral Adaptation Plan 2019 (hereafter referred to as the Transport Adaptation Plan) recognises the risk of climate change impact on the Irish transport sector and its infrastructure. The plan sets out adaptation measures to protect the transport sector. The plan references the ‘*Eastern Rail Corridor*’, (of which a section includes the Project), as a case study to show the coastal erosion impacts already incurred in this region.

‘There was a 135m recession of the coastline between 1905 and 1990 at an average of 1.4m per year. This rate has accelerated in recent years to 2m annually. Notably, the sea cliff near Ballygerry at Rosslare Harbour suffers erosion of up to two metres annually which could mean that the rail corridor could be unable to be used by 2030. From data and modelling prepared by the OPW, it is estimated that the coastline will continue to recede and could impact the existing rail corridor before 2030.’

The Plan has an overarching adaptation goal which is to "*ensure that the sector can fulfil its continuing economic, social and environmental objectives by ensuring that transport infrastructure is safeguarded from the impacts of climate change*."

1.3.1.5 Coastal Change Management Strategy 2023

The Coastal Change Management Strategy was published by the OPW in 2023 to provide a roadmap for responding to coastal change management in a structured and planned way to provide the basis for a long term strategy for an integrated and coordinated approach to coastal change management.

It provides the following in relation to policy approach communications and data and research:

- The need for coastal change management plans to be prepared to identify the appropriate measures necessary to best manage the risks associated with coastal change, in the short, medium and longer terms, with such plans reviewed and updated at appropriate intervals;
- The consideration and application of high-level risk management policy options along the coastline or parts thereof. For example, no active intervention, hold the line, managed realignment, managed retreat or advance the line, along each reach of the coastline, as used in the UK Shoreline Management Plans
- The use of a sediment management approach which can include various scales of assessment based on sediment cells and sub-cells;
- The emphasis on sustainable management of the coastline as evident in the approach in the UK, the Netherlands and Denmark;
- The importance of clearly communicating risks associated with coastal change to coastal communities and including these communities in the decision making process;
- The availability of high quality data to inform the decision making process. For example, regular monitoring of coastal retreat and dunes (annually), monitoring of dyke consolidation and monitoring of water levels and wave conditions as is carried out in Denmark. Similarly, the National Network of Regional Coastal Monitoring Programmes of England collect coastal monitoring data in a co-ordinated and systematic manner to serve their coastal management needs; and
- The importance of research to provide the up-to-date information required to manage the risk from coastal change. In the UK, the Environment Agency manages a Flood and Coastal Erosion Risk Management Research and Development Programme which is a collaborative and academic led research programme to provide information on the management of flood and coastal erosion risk.

In addition to the above, it is noted that the OPWs' Managing Flood Risk in Ireland (November 2023) sets out that "*the OPW works closely with Local Authorities in the design and delivery of major flood relief schemes. To compliment the delivery of these major schemes, the OPWs 'Minor flood mitigation works and coastal protection scheme' provides funding to local authorities to provide local flooding solutions with over 680 projects completed to November 2023, providing protection to some 7,800 properties*." The Managing Flood Risk in Ireland document also outlines that "*€1.3billion has been committed over the lifetime of the National Development Plan to 2030 to protect approximately 23,000 properties in threatened communities from river and coastal flood risk*."

1.3.2 Regional Plans / Policy

There are a number of national plans of relevance to the proposed Project. These include:

- Regional Spatial Economic Strategies, comprising of:
  - Eastern and Midlands Region
  - Southern Region
- Greater Dublin Areas Transport Strategy

1.3.2.1 Regional Spatial and Economic Strategy (RSES) 2019-2031

The RSES provides the framework to deliver the objectives of Project Ireland 2040 in specific regions. The RSES that are relevant to the proposed Projects are the Eastern & Midlands Region (Dublin & Wicklow) and the Southern Region (as the proposed works will protect the Dublin to Rosslare Railway Line).

Both RSES identify the impacts of coastal erosion and climate change on transport networks and highlight the importance of the rail connection to Rosslare. The below sections will outline the specific objectives for the Projects in each region.

1.3.2.1.1 Eastern & Midlands Region RSES

The Projects fall into the remit of the Eastern & Midlands Regional Assembly (EMRA). All of the CCA's fall under the remit of the Eastern and Midlands Regional Assembly (EMRA). The EMRA RSES outlines a number of Regional Strategic Outcomes (RSO's) and Regional Policy Objectives (RPO's) that relate to the Project.

An overall objective of the EMRA RSES is to protect and enhance strategic connections which includes the Eastern Corridor (rail link to Rosslare Europort). This strategic connection is identified as a key growth enabler for the region.

The following RPO's support the Project:

RPO 4.58 - To support ongoing investment in rail infrastructure to ensure its continued renewal, maintenance and improvement to a high level to ensure high quality of frequency, safety, service, accessibility and connectivity.

RPO 7.3 - EMRA will support the use of Integrated Coastal Zone Management (ICZM) to enable collaborative and stakeholder engagement approaches to the management and protection of coastal resources against coastal erosion, flooding and other threats.

RPO 7.4 - Statutory land use plans shall take account of the risk of coastal erosion; whereby new development should be avoided in areas at risk of coastal erosion to the greatest extent practicable.

RSO 8 - Ensure the long-term management of flood risk and build resilience to increased risks of extreme weather events, changes in sea level and patterns of coastal erosion to protect property, critical infrastructure and food security in the Region.

RPO 8.16 - Support the improvement and protection of the TEN-T network to strengthen access routes to Ireland's ports, including investment in the ongoing development of the N11/M11 to improve connectivity to Rosslare and improvements to the Dublin-Wexford Rail line.

These objectives focus on continuing investment, coastal protection and supporting port development within the region.

1.3.2.1.2 Southern Region RSES

Whilst the Projects do not fall within this geographic area, the proposed works will benefit the Dublin to Rosslare Railway Line and the population that utilises this transport mode/corridor. Wexford town is identified as a key town in the Southern Region RSES and it has a number of objectives that are of importance to the proposed Projects which are outlined below.

The following RPO's support the Project:

RPO 11 - It is an objective to seek investment in holistic infrastructure inclusive of utilities, transportation, social and community, digital infrastructure and smart technologies environmental (including facilitation of climate change mitigation and of biodiversity promotion), climate change adaptation and future proofing infrastructure including flood risk management measures and flood defence schemes, recreational, arts and cultural that will deliver sustainable growth in Key Towns subject to the outcome of the planning process and environmental assessments

RPO 16a - To strengthen the role of Wexford as a strategic location, a self-sustaining regional economic driver and Key Town on the Eastern Corridor. The RSES seeks to leverage its strategic location and accessibility to Rosslare Europort and to build upon its inherent strengths including digital connectivity, skills, innovation and enterprise, tourism, culture and retail services;

RPO 16b - To develop supporting industrial, commercial infrastructure and residential development in Wexford Town for the port function at Rosslare Europort;

RPO 16c - To strengthen 'steady state' investment in existing rail infrastructure and seek investment for improved infrastructure and services including increased line speeds to ensure its continued renewal and maintenance to a high level in order to provide quality levels of safety, service, accessibility and connectivity including improved frequency and journey times;

RPO 16d - To support development of additional capacity at Rosslare Europort and provision of freight rail services and facilities to support sustainable increases in port operations;

RPO 120 - It is an objective to support measures (including Integrated Coastal Zone Management) for the management and protection of coastal resources and communities against coastal erosion, flooding and other threats. Statutory land use plans shall take account of the risk of coastal erosion.

RPO 140a - Sustainably maintain, support and enhance the Region's International Connectivity Transport Network including the Trans European Transport Network (TEN-T) which seeks the development of a Europewide network of railway lines, roads, inland waterways, maritime shipping routes, ports, airports and railroad terminals;

RPO 140b – Sustainably maintain the strategic capacity and safety of the national roads and rail network including planning for future capacity enhancements to ensure effective land transport connections to the major ports, airports and markets;

RPO 140d - Sustainably support infrastructure for electric and low carbon fuel infrastructure along TEN-T Core and Comprehensive Network;

RPO 142a – Strengthen and develop the strategic international, national and regional economic roles of our Tier 1 Ports (Port of Cork and Shannon-Foynes Port) and Tier 2 Ports (Port of Waterford and Rosslare Europort) and support the strategic role of our Region's port and harbour assets under the National Marine Planning Framework;

RPO 142c - Strengthen and develop the strategic regional economic role of other regional fishery harbours, ports and harbours;

RPO 144 - It is an objective to complement investment in port infrastructure by seeking the sustainable development of improved access infrastructure to ports from their regional catchments, including the promotion of rail access where practicable; and

RPO 146 - Strengthening and maintaining access to ports through enhanced transport networks and improved journey times including support for M11 and N80 improved connectivity to Rosslare, N28 Cork to Ringaskiddy Road and N21/N69 (Foynes to Limerick Road Scheme including Adare bypass).

The objectives outlined in this document focus greatly on the support of Rosslare Europort, continuing investment of rail infrastructure and supporting Wexford Town as a key growth enabler.

1.3.2.2 Greater Dublin Area (GDA) Transport Strategy 2022-2042

CCA1 – CCA6.2 fall within the remit of the Greater Dublin Area (GDA) Transport Strategy 2022-2042, hereafter referred to as the Transport Strategy. The Transport Strategy outlines a number of policy objectives to support the proposed Projects through climate change proofing existing public infrastructure and improving connectivity within the GDA.

The purpose of GDATS is to *"provide a framework for planning and delivery of transport infrastructure and services within the GDA."* (NTA 2022). The policies that helped to frame this policy are found within Project Ireland 2040 and the EMRA RSES.

- **Measure PT2 Climate Proofing New Public Transport Infrastructure -** The NTA will ensure that all new public transport infrastructure is proofed against the potential impacts arising from climate change.
- Measure PT3 Resilience of the Public Transport Services - The NTA and transport operators will prepare a public transport resilience strategy for the GDA.
- **Measure RAIL1 DART+ -** The DART+ Programme will be implemented, providing electrified services to Drogheda in the north and Maynooth plus Celbridge in the west, in addition to an enhanced level of service to Greystones. The programme will include additional fleet, aligned with higher passenger demand, and a higher frequency of service on all lines.
- **Measure RAIL3 DART Extension -** The NTA and Irish Rail will, over the lifetime of the Strategy, extend the DART to deliver electrified rail services to the following towns: Sallins / Naas; Kilcock; and Wicklow
- **Measure RAIL 5** - Regional and Intercity Services - The NTA will continue to work with Irish Rail to improve regional and intercity services which will benefit connectivity within and to the GDA.
- **Measure FREIGHT1 Strategy for Sustainable Freight Distribution -** It is the intention of the NTA, in collaboration with other authorities, including TII and Irish Rail, and stakeholders to prepare a Strategy for Sustainable Freight Distribution for the Greater Dublin Area – to inter alia, support the decarbonisation of the freight sector, to seek to further integrate smart technologies in logistics management and to reinforce the important role that the strategic road and rail network play in the efficient movement of freight.
- **Measure FREIGHT4 Rail Freight -** The NTA will support Irish Rail in the implementation of the outcomes of the Rail Freight 2040 Strategy.

1.3.3 Local Plans / Policy

The study areas are located within three local authority areas, namely Dublin City Council (DCC), Dún Laoghaire-Rathdown County Council (DLRCC) and Wicklow County Council (WCC), and therefore fall under three separate County Development Plans as outlined in the following sections. At the time of writing the Greystones – Delgany LAP concluded its pre-draft consultation stage. Reference figures can be found for each CCA as Figure 2.2 - CCA1, Figure 2.2 – CCA2/3, Figure 2.2 – CCA5, Figure 2.2 – CCA6.1 and Figure 2.2 – CCA6.2.

- CCA1 is within the functional areas of DCC and DLR.
- CCA2/3 is within the functional area of DLR.
- CCA5 is within the functional area of WCC.
- CCA6.1 is within the functional area of WCC.
- CCA6.2 is within the functional area of WCC.

This section has assessed the entire cell study area to allow for some flexibility and location of construction compounds.

1.3.3.1 Dublin City Development Plan 2022-2028

The Dublin City Council Development Plan 2022-2028 (hereafter referred to as the DCC Development Plan) was adopted in November 2022 and came into effect on 14 December 2022. The development plan guides the future growth and development of the DCC area. The only CCA study area which is located within DCC's functional area is CCA1. The north-western end of the CCA1 study area, begins from approximately Trimleston Avenue and ends at the Booterstown Nature Reserve, where the DLRCC administration zone begins.

The DCC Development Plan does not mention ECRIPP in particular; however, it is clear coastal zone management, and the protection of the coastal area is an important matter. The DCC Development Plan includes Policy SMT23 – The Rail Network and Freight Transport, which supports working with Iarnród Éireann/Irish Rail to achieve a coordinated approach to improving the rail network.

The DCC Development Plan sets out a range of policies applicable to ECRIPP, which includes:

CA29 – Coastal Zone Management;
SI14 – Strategic Flood Risk Assessment;
SI18 – Protection of Flood Alleviation Infrastructure;
GI35 – General Protection of Coastal Zone; and
SMT23 – The Rail Network and Freight Transport.

The CCA1 study area within DCC has a number of zoning objectives, including:

Z9 – Amenity/Open Space Lands/Green Network;
Z1 to Z3 – Residential/neighbourhood zoning;
Z6 – Employment/Enterprise Zones; and
Z15 – Community and Institutional Resource Lands (Education, Recreation, Community, Green Infrastructure and Health).

1.3.3.2 Draft Dublin City Climate Action Plan

The Draft Dublin City Climate Action Plan 2024 – 2029 was published for consultation on the 15th September 2023. The second climate action plan sets out Dublin City Councils (DCC) commitment to prepare the region for known impacts of climate change which include, sea level rise, flooding and extreme weather events. The climate action plan has 3 key targets:

‘A 51% reduction in greenhouse gas emissions in line with our National Climate Objective by 2030
A Climate resilient city prepared for the known and unknown impacts of climate change
A just transition meaning that the actions we take do not cause harm.’

It is noted within the Action Plan that the risks associated with coastal flooding are projected to increase in the future. The Draft Climate Action Plan incorporates Environmental Governance Principles which complies with various legislation, policies and plans that are part of the statutory / consenting framework. Principle EG4 specifically relates to ECRIPP:

‘Flood and coastal defence projects, or related maintenance works, shall be carried out in a manner that promotes climate action biodiversity related co-benefits, and shall have due regard for the protection and enhancement of rare, protected or important habitats and species.*’*

1.3.3.3 Dún Laoghaire-Rathdown County Development Plan 2022-2028

Dún Laoghaire-Rathdown (DLR) County Development Plan 2022-2028 (hereafter referred to as the DLRCC Development Plan) was adopted on 10 March 2022 and came into effect on 21 April 2023. The Plan sets out the primary goals and objectives that will help to guide and shape the proper planning and continuing sustainable development of the County.

The majority of the CCA1 study area is located within DLRCC's functional area, all but the section that lies within DCC, as described in the previous section. All of the study area for CCA2-3 lies within DLRCC's functional area.

The Plan does not mention ECRIPP in particular; however, it is clear coastal zone management, and the protection of the coastal area is an important matter. A number of distinct map-based objectives are relevant to the cells within the DLR functional area; notably records of monuments and places which are likely to be Martello towers. A number of protected areas are within the defined works area including Architectural Conservation Areas (ACA's).

The Plan sets out a range of applicable policies including, among others:

EI24 – Coastal Defence;
EI23 – Cross Boundary Flood Management;
GIB8 – Coastline Parks and Harbours; and
GIB11 – Coastal Area Feasibility Study.

The CCA1 and CCA2-3 study areas have a number of zoning objectives within the DLRCC Plan, including:

CCA1

To protect, provide for and/or improve mixed-use district centre facilities; and
To protect, provide for and/or improve major town centre facilities.

CCA1 and CCA2-3

Objective A – To provide residential development and improve residential amenity while protecting the existing residential amenities;
Objective F – To preserve and provide for open space with ancillary active recreational amenities;
Objective SNI – To protect, improve and encourage the provision of sustainable neighbourhood infrastructure;
Objective DC – To protect, provide for and/or improve mixed-use district centre facilities (CCA1 only);
Objective NC – To protect, provide for and/or improve mixed-use neighbourhood centre facilities (CCA1 only);
Objective W – To provide for waterfront development and harbour-related uses (CCA1 only); and
Objective MTC – To protect, provide for and/or improve major town centre facilities (CCA1 only).

There are also a number of location-specific objectives within the study areas of both CCAs, those of particular relevance being:

Specific Local Objective 18 – To promote the development of the Sutton to Sandycove Promenade and Cycleway as a component part of the National East Coast Trail Cycle Route, and also the Dublin Bay trail from the boundary with Dublin City up to the boundary with County Wicklow. Any development proposal will protect and enhance public access to the coast where feasible. Any development proposals shall be subject to Appropriate Assessment Screening in accordance with the requirements of the EU Habitats Directive to ensure the protection and preservation of all designated Special Areas of Conservation (SACs), Special Protection Areas (SPAs), and Proposed Natural Heritage Areas (pNHAs) in Dublin Bay and the surrounding area;
Specific Local Objective 17 – To protect and conserve South Dublin Bay SAC;
Specific Local Objective 12 – To develop Blackrock Park in accordance with a Masterplan approved by the Council;

- Specific Local Objective 35 – To promote Water Leisure Facilities for public use at the coastal fringe of "The Gut" and rear of the West Pier, subject to the appropriate environmental assessments, including any assessment required under the EU Habitats Directive in co-operation with the relevant agencies;
- Specific Local Objective 24 – To encourage the redevelopment of "The Gut" adjacent to the West Pier to include improved access to the area;
- Specific Local Objective 130 – To ensure that development within this objective area does not (i) have a significant negative impact on the environmental sensitivities in the area including those identified in the Strategic Environmental Assessment (SEA) Environmental Report, and/or (ii) does not significantly detract from the character of the area, either visually or by generating traffic volumes which would necessitate road widening, or other significant improvements;
- Specific Local Objective 46 – To protect and conserve Rockabill to Dalkey Island SAC ;
- Specific Local Objective 136 – To protect the Dalkey Railway tunnel corridor for railway purposes in the interest of railway safety; and
- Specific Local Objective 152 – To offer a requisite level of protection and maintenance to the site known as Éire sign #7 (Hawk Cliff, Vico Road), such that this site will be afforded protection from any future activities which may either intentionally or unintentionally damage, undermine or remove this important historical heritage site, and that this Council agrees to a reasonable level of maintenance of the site insofar as is practicable.

1.3.3.3.1 Blackrock Local Area Plan 2015-2020 (extended to 2025)

The Blackrock Local Area Plan (LAP) 2015-2020 was adopted in March 2015. This was extended by five years in March 2020 to March 2025. The study area for CCA1 briefly passes through the functional area of the Blackrock LAP. Land use zonings within the CCA1 study area includes:

- Objective A – Residential Zoning;
- Objective DC – District Centre Zoning; and
- Objective F – Open Space Zoning.

1.3.3.3.2 Dún Laoghaire-Rathdown County Council Coastal Strategy

The Coastal Defence Strategy Study was published in September 2010. It was prepared to manage the coastal defence issues within the DLR functional area.

The recommendations of the Strategy state:

> *"Whole coast measures to reduce risk – Monitoring, Planning Restrictions, Access and Warning signs and forecasting/emergency planning;*
> *Undertake defence measures to specific identified risk areas;*
> *Site investigations and assessments carried out to determine preferred defences;*
> *Prepare relevant assessments to acquire the planning and foreshore permissions;*
> *Work with the OPW to obtain funding; and*
> *Adopt the findings of the strategy into the County Development Plan."*

The DLR Coastal Defence Strategy is referenced within the DLR County Development Plan 2022-2028. However, the Strategy is currently under review and due to be updated.

1.3.3.4 Draft Dún Laoghaire Climate Action Plan

The draft Dún Laoghaire Climate Action Plan 2024 –2029 was published for consultation on the 20th September 2023. The Dún Laoghaire (DLR) draft climate action plan covers six key areas; Energy and Buildings, Transport, Flood Resilience, Nature Based Solutions, Circular Economy and Resource Management and Community Management.

The actions within the Draft action plan are set out to achieve the four targets of the plan which state:

> ‘ *50% improvement in the Council's energy efficiency by 2030*
> *51% reduction in the Council's greenhouse gas emissions by 2030*
> *To make Dublin a climate resilient region, by reducing the impacts of future climate change-related events, and*
> *To actively engage and inform our communities on climate action.*‘

Flooding and coastal erosion have been noted as having the potential to undermine critical infrastructure. The risk associated with coastal erosion is projected as increasing with sea level rise. The foreword specifically states:

‘*The Council has also consulted with Wicklow County Council and other state agencies, in respect to protecting critical infrastructure that is at risk from climate impacts, such as collaborating with Irish Rail on the impact of coastal erosion affecting the provision of DART services.*’

1.3.3.5 Wicklow County Development Plan 2022-2028

The Wicklow County Development Plan 2022-2028 (hereafter referred to as the WCC Development Plan) was adopted on 12 September 2022 and came into effect on 23 October 2022.

CCA5 and CCA6.1/2 are within the functional area of WCC. The WCC Development Plan sets out a strategic spatial planning framework for guiding the physical, economic and social development of the County. The land use zonings of the key areas are not set out as part of the WCC Development Plan; these areas and the map-based objectives are set out within the specific LAPs and smaller settlement plans. These plans are to be read in conjunction with the County Development Plan. The relevant plans are as follows:

1.3.3.5.1 Bray Municipal District Local Area Plan 2018-2024

The study area for CCA5 is partly within the functional area of the Bray LAP, along the Strand Road approximately between Convent Avenue to the southern end of Strand Road. The land use zonings within the study area are:

OS1 – Open Space;
SF – Bray Seafront; and
RE – Existing Residential.

1.3.3.5.2 Greystones-Delgany and Kilcoole Local Area Plan 2013-2019

The study areas for both CCA5 and CCA6.1 overlap with this LAP. The area to the south of Bray Head which lies within CCA5, incorporates zoned lands from this LAP (predominantly zoned as “GB Greenbelt”), while the majority of the LAP-zoned lands are located within the study area for CCA6.1. Therefore, all LAP zoning is represented within this study area.

1.3.3.5.3 Newcastle Town Plan 2022-2028

The study areas for both CCA6.1 and CCA6.2 overlap with this town plan. The zoned area is split into three types: Primary Development (the centre of the town); Secondary Development (the area immediately surrounding the town centre); and Tertiary Development (areas to the outskirts of the town). All three development zones are located within both study areas.

1.3.3.5.4 Wicklow Town-Rathnew Development Plan 2013-2019

The study area for CCA6.2 encompasses the majority of this LAP area at the southern end of the study area. Therefore, all of the zoning types within this LAP are represented within the study area. Of particular relevance is the area zoned as "CZ Conservation Zone" which covers much of the northern coastal part of Wicklow Town.

1.3.3.6 Wicklow Climate Action Plan

The Wicklow Climate Action Plan 2024 – 2029 was launched on the 21 December 2022. The plan is split into eight key goals categorised under five thematic areas: Governance and leadership, Built Environment and Transport, Natural Environment and Green Infrastructure, Communities Resilience and Transition and Sustainability and Resource Management.

Theme 3 Goal states: '*Deliver on climate adaptation, biodiversity resilience and enhanced capacity for our environment to adapt to changing conditions.*'

The objectives to achieve the goal relevant to ECRIPP are:

- 3.2 Maintain roads and infrastructure in good state;
- 3.3 Protect communities and infrastructure from the risk of flooding;
- 3.4 Protect communities from the risk of coastal erosion; and
- 3.7 Build collaboration with stakeholders to increase participation in measures to protect resources and communities from the impact of climate change.

1.3.4 Planning History

A planning history search has been undertaken to identify any major planning applications which are noteworthy within the study areas. The following sections highlight the key planned developments as of June 2023 by study area. At this time an updated review has not taken place, further applications may have come forward prior to the previous check. An additional planning history review will be carried out prior to submission.

1.3.4.1 CCA1 Study Area

There are a number of planning applications within the study area (refer to Figure 1.3 - CCA1); however, the majority of these are small scale developments associated with making changes to single dwellings, or minor changes to commercial properties. There are a number of larger scale planning applications with planning permission to the landward side of the railway tracks within the study area. These include:

- 2220/16 – Construction of an extension to one of the buildings within St Mary's Nursing Home;
- A number of planning applications within the Elm Park complex associated with changes to the existing infrastructure and the addition of new residential units;
- 2735/18 – Alterations to an existing petrol station;
- A number of planning applications associated with the Frascati and Blackrock Shopping Centres in Blackrock; and
- ABP-313509 – Belfield/Blackrock to City Centre Core Bus Corridor Scheme.

1.3.4.2 CCA2-3 Study Area

There are a number of planning applications within the study area (refer to Figure 1.3 – CCA2/3); however, they are almost exclusively small scale developments associated with amendments to single residential properties.

1.3.4.3 CCA5 Study Area

There are a number of planning applications within the study area (refer to Figure 1.3 – CCA5); however, the majority of these are small scale developments associated with making changes to single dwellings, or minor changes to commercial properties. There are a number of larger scale planning applications with planning permission within the study area, including:

A number of planning applications associated with the refurbishment and change of the old Bray Head Hotel to a residential development (currently under construction);
23254 – Part 8 application for enhancement of Raheen Public Park on the northern side of Bray Head; and
A number of planning applications associated with the Greystones Marina development.

1.3.4.4 CCA6.1 Study Area

There are a number of planning applications within the study area (refer to Figure 1.3 – CCA6.1); however, the majority of these are small scale developments associated with making changes to single dwellings, or minor changes to commercial properties. Given the scale of this study area, there are a number of larger scale developments for which planning applications have been lodged and/or planning permission has been granted. These include:

A number of planning applications associated with the Greystones Marina development;
A number of large housing developments in Greystones/Delgany and Kilcoole, particularly in the Charlesland/Farrankelly areas to the south-west of Greystones and on the eastern side of Kilcoole;
Two applications associated with the Greystones United AFC grounds adjacent to the railway line south of Greystones Railway Station;
221239 – Part 8 application to construct a boardwalk on the South Beach in Greystones in order to improve beach access immediately adjacent to the railway line, on the seaside;
20620 – Permission for a film studio media campus on a large site close to the railway line in Greystones; and
17480 – Permission for an inert subsoil and topsoil landfill located to the north-east of Kilcoole Village.

1.3.4.5 CCA6.2 Study Area

There are a number of planning applications within the study area (refer to Figure 1.3 – CCA6.2); however, the majority of these are small scale developments associated with making changes to single dwellings, or minor changes to commercial or agricultural properties. Given the scale of this study area, there are a number of larger scale developments for which planning applications have been lodged and/or planning permission has been granted. These include:

161082 – Permission for a solar PV development south of Newcastle;
A number of large residential developments in Wicklow Town/Rathnew; and
211263 – Permission for new infrastructure for sludge dewatering in Wicklow Wastewater Treatment Plant, immediately adjacent to the railway line.

1.3.5 Marine Plans / Policy

1.3.5.1 National Marine Planning Framework (NMPF) 2040

The NMPF was published in July 2021 and is intended as the marine equivalent to the National Planning Framework (NPF). It stands as a single plan for the entire maritime area with more detailed regional plans to be developed at a later date. There are a number of "Overarching Marine Planning Policies" (OMPPs) along with "Sectoral Marine Planning Policies" (SMPPs).

With regard to coastal erosion and flood defence works, the following is set out under Climate Change Policy 1:

'Proposals should demonstrate how they:

> *avoid contribution to adverse changes to physical features of the coast;*
> *enhance, restore or recreate habitats that provide a flood defence or carbon sequestration ecosystem services where possible.*

> *Where potential significant adverse impacts upon habitats that provide a flood defence or carbon sequestration ecosystem services are identified, these must be in order of preference and in accordance with legal requirements* [be]*:*

> a) *avoided,*
> b) *minimised,*
> c) *mitigated,*
> d) *if it is not possible to mitigate significant adverse impacts, the reasons for proceeding must be set out.*

This policy should be included as part of statutory environmental assessments where such assessments are required.'

In addition to the above and again with regard to coastal erosion and flood defence, the NMPF acknowledges that the Office for Public Works (OPW) '*have functions and responsibilities in relation to coastal protection and coastal flooding*'. It continues to outline the role of the OPW as follows:

> ' *Undertaking risk assessments associated with coastal flooding and coastal erosion at selected coastal sites making use of innovative technologies and methodologies;*
> *Provision of an advisory service in relation to coastal flooding and coastal erosion to support the preparation of annual coastal protection funding programmes, the Catchment Flood Risk Assessment and Management (CFRAM) programme, and to inform broader policy development; and*
> *Maintenance of coastal protection schemes constructed under the Coast Protection Act, 1963*.'

As well as general guidance for marine development, the NMPF also includes Marine Map Based Objectives (MMBOs) and Marine Spatially Specific Policy Objectives (SSPOs) outlined in Table 1-1.

Table 1-1: National Marine Planning Framework (NMPF) and Marine Map Based Objectives (MMBOs) per CCA

NMPF MMBO Objective	Relevant CCA
Blue Flag beaches	CCA1
Bottlenose Dolphin Range	CCA2-3 CCA5 CCA6.1

NMPF MMBO Objective	Relevant CCA
	CCA6.2
Coastal Built Heritage Sites	CCA1 CCA2-3 CCA5
Coastal type – Broad Estuarine Bays and Complex Low Plateau and Cliff Coastline	CCA2-3 CCA5 CCA6.1 CCA6.2
Coastal type – Modified Historic Urban Bay	CCA1
Common Dolphin Range	CCA1 CCA2-3 CCA5 CCA6.1 CCA6.2
Grey Seal Distribution	CCA1 CCA2-3 CCA5 CCA6.1 CCA6.2
Harbour Seal Distribution	CCA2-3 CCA5 CCA6.1
Leatherback Turtle Distribution	CCA1 CCA2-3 CCA5 CCA6.1 CCA6.2
Leatherback Turtle Range	CCA1 CCA2-3 CCA5 CCA6.1 CCA6.2
Limits of Harbours	CCA6.2
SAC	CCA1 CCA5 CCA6.1 CCA6.2
Sea Cliff	CCA5
Seabird Breeding Distribution – Kittiwake	CCA1 CCA5 CCA6.1 CCA6.2
Shipwrecks in Irish Waters	CCA2-3 CCA6.2
SPA	CCA1 CCA2-3 CCA6.1 CCA6.2
UNESCO Global Geoparks and Biospheres	CCA1 CCA2-3

Table 1-2: Description of National Marine Planning Framework (NMPF) and Marine Spatially Specific Policy Objectives (SSPOs) per CCA

NMPF SSPO Objective	Description	Relevant CCA
Fisheries Policy 1	Proposals that may have significant adverse impacts on access for existing fishing activities, must demonstrate that they will, in order of preference: Avoid; Minimise; or Mitigate such impacts. If it is not possible to mitigate significant adverse impacts on fishing activity, the public benefits for proceeding with the proposal that outweigh the significant adverse impacts on existing fishing activity must be demonstrated	CCA1 CCA6.1 CCA6.2
Heritage Assets Policy 1	Proposals that demonstrate they will contribute to enhancing the significance of heritage assets will be supported, subject to the outcome of statutory environmental assessment processes and subsequent decision by the competent authority, and where they contribute to the policies and objectives of the NMPF. Proposals unable to contribute to enhancing the significance of heritage assets will only be supported if they demonstrate that they will, in order of preference: a) Avoid; b) Minimise; or c) Mitigate harm to the significance of heritage assets; and d) If it is not possible, to mitigate harm, then the public benefits for proceeding with the proposal must outweigh the harm to the significance of the heritage assets.	CCA1 CCA6.2
Ports, Harbours and Shipping Policy 4	Proposals within ports limits, beside or in the vicinity of ports, and / or that impact upon the main routes of significance to a port, must demonstrate within applications that they have: Been informed by consultation at pre-application stage or earlier with the relevant port authority; Have carried out a navigational risk assessment including an analysis of maritime traffic in the area; and Have consulted Department of Transport, [Main Survey Office] MSO and Commissioners of Irish Lights. Applicants must continue to engage parties identified in pre-application processes as appropriate during the decision-making process.	CCA1 CCA6.2
Protected Marine Sites Policy 2	Proposals supporting the objectives of protected marine sites should be supported and: Be informed by appropriate guidance; and Must demonstrate that they are in accordance with legal requirements, including statutory advice provided by authorities relevant to protected marine sites.	CCA1 CCA6.1 CCA6.2

2 Environmental Constraints

2.1 Biodiversity

2.1.1 Introduction

This section provides a description of the potential biodiversity constraints identified across each CCA study area. The key objective of this section of this report is to identify important biodiversity receptors that should be considered throughout the development of the ECRIPP projects.

2.1.2 Methodology

This section identifies the constraints aspects of the study area in relation to biodiversity, as per the Guidelines for Assessment of Ecological Impacts of National Roads Schemes (National Roads Authority, 2009). A sensitive receptor in this context relates to the following types of features:

- Designated/protected site e.g., Special Areas of Conservation (SACs) and Special Protection Areas (SPAs);
- Nationally designated sites e.g., Natural Heritage Areas (NHAs) and Proposed Natural Heritage Areas (pNHAs);
- Protected species e.g., Annexes II and IV;
- Habitats (artificial, built and natural) e.g., Annex I; and
- Birds and mammals.

Key sources of information relating to these types of features have been sourced from the National Parks and Wildlife Service (NPWS), and ecological site surveys.

2.1.3 Constraints per CCA

2.1.3.1 CCA1 – Merrion Gates to Dún Laoghaire

2.1.3.1.1 International Sites

Part of the study area is located within South Dublin Bay, with the following protected designations Ramsar, SAC, SPA and pNHA (refer to Figure 3.1.1 - CCA1; Figure 3.1.2 - CCA1 and Figure 3.2 - CCA1).

Dublin Bay Biosphere was officially recognised in 1981 by UNESCO as a Biosphere, designating North Bull Island because of its rare and internationally important habitats and species of wildlife[1]

Sandymount Strand / Tolka Estuary Ramsar (Code 832) contains an excellent and extensive area of intertidal mud and sand, which are of importance as a habitat for wintering waterbirds.

The area of the Ramsar designation is contained within the boundaries of both the EU Birds Directive (2009/147/EC) SPA for South Dublin Bay and River Tolka Estuary (004024), and the EU Habitats Directive (92/43/EEC) boundary for South Dublin Bay SAC (000210). Although the Ramsar site is smaller, it is an integral part of the wider wetland complex that is the SPA and SAC.

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[1] See www.dublinbaybiosphere.ie

2.1.3.1.2 European Sites

South Dublin Bay and River Tolka Estuary SPA (Code 004024) has an objective to maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA. The site is a SPA under the EU Birds Directive, of special conservation interest for the following species:

Light-bellied Brent Goose (*Branta bernicla hrota*) [A046];
Oystercatcher (*Haematopus ostralegus*) [A130];
Ringed Plover (*Charadrius hiaticula*) [A137];
Grey Plover (*Pluvialis squatarola*) [A141];
Knot (*Calidris canutus*) [A143];
Sanderling (*Calidris alba*) [A144];
Dunlin (*Calidris alpina*) [A149];
Bar-tailed Godwit (*Limosa lapponica*) [A157];
Redshank (*Tringa totanus*) [A162];
Black-headed Gull (*Chroicocephalus ridibundus*) [A179];
Roseate Tern (*Sterna dougallii*) [A192];
Common Tern (*Sterna hirundo*) [A193];
Arctic Tern (*Sterna paradisaea*) [A194]; and
Wetland and Waterbirds [A999].

The South Dublin Bay and River Tolka Estuary SPA is of ornithological importance as it supports an internationally important population of Light-bellied Brent Goose, and nationally important populations of a further nine wintering species. The site also supports a nationally important colony of breeding Common Tern and is an internationally important passage/staging site for three tern species. It is recognised that four of the species that regularly occur at this site are listed on Annex I of the EU Birds Directive.

The South Dublin Bay SAC (Code 000210) has an objective to maintain or restore the favourable conservation condition of the Annex I habitats for which the SAC has been selected. It lies south of the River Liffey in County Dublin and extends from the South Wall to the West Pier at Dún Laoghaire. It is an intertidal site with extensive areas of sand and mudflats. The sediments are mainly sands but grade to sandy muds near the shore at Merrion Gates. The main channel which drains the area is Cockle Lake. Qualifying interests are:

Tidal Mudflats and Sandflats [1140];
Annual vegetation of drift lines [1210];
Salicornia and other annuals colonising mud and sand [1310]; and
Embryonic shifting dunes [2110].

2.1.3.1.3 Nationally Designated Sites

There are no NHAs within the study area but there is a pNHA: South Dublin Bay pNHA (Code 000210). See the SAC/SPA above for further information.

2.1.3.1.4 Further Constraints for Consideration within CCA1

An internationally important population of Light-bellied Brent Goose occurs regularly, and newly arrived birds in the autumn feed on the Eelgrass bed at Merrion.

Several small, sandy beaches with incipient dune formation occur in the northern and western sectors of the site, notably at Merrion/Booterstown. The formation at Booterstown is very recent. Drift line vegetation occurs in association with the embryonic and incipient fore dunes. Typically drift lines occur in a band approximately 5m wide, though at Booterstown this zone is wider in places. A small area of pioneer saltmarsh now occurs in the lee of an embryonic sand dune just north of Booterstown Station. This early stage of saltmarsh development is here characterised by the presence of pioneer stands of glassworts (*Salicornia spp.)* occurring below an area of drift line vegetation.

Large numbers of gulls roost in South Dublin Bay, e.g., 4,500 Black-headed Gulls in February 1990; 500 Common Gulls in February 1991. It is also an important Tern roost in the autumn, regularly holding 2000-3000 terns including Roseate Terns, a species listed on Annex I of the EU Birds Directive.

2.1.3.2 CCA2-3 – Dalkey Tunnel to Killiney South

This section identifies the constraints aspects of the study area in relation to biodiversity. A sensitive receptor in this context relates to the following types of features:

Designated/protected site e.g., SACs and SPAs; and
Nationally designated sites e.g., NHAs and pNHAs.

Key sources of information relating to these types of features have been identified with reference to National Parks and Wildlife Service (NPWS).

The study area extends from Dalkey Tunnel to the southern end of Killiney (refer to Figure 3.1.1 – CCA2/3; Figure 3.1.2 – CCA2/3 and Figure 3.2 – CCA2/3).

2.1.3.2.1 European Sites

The study area traverses an SPA and SAC as discussed below.

Dalkey Island SPA (Code 004172) has an objective to maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA. This site is a SPA under the EU Birds Directive, of special conservation interest for the following species:

Roseate Tern (*Sterna dougallii*) [A192];
Common Tern (*Sterna hirundo*) [A193]; and
Arctic Tern (*Sterna paradisaea*) [A194].

The site is linked to another important post-breeding/pre-migration autumn Tern roost area in Dublin Bay. Dalkey Islands SPA is of particular importance as a post-breeding/pre-migration autumn roost area for Roseate Tern, Common Tern and Arctic Tern. The recent nesting by Roseate Tern is highly significant. All three tern species using the site are listed on Annex I of the EU Birds Directive.

Rockabill and Dalkey Island SAC (Code 003000) has an objective to maintain or restore the favourable conservation condition of the Annex I habitats and Annex II species for which the SAC has been selected. It surrounds Dalkey Island and lies within the northern extent of the CCA2-3 study area.

Qualifying Interests are:

Reefs [1170]; and
Harbour Porpoise (*Phocoena phocoena*) [1351].

This site is of conservation importance for reefs, listed on Annex I, and Harbour Porpoise, listed on Annex II, of the EU Habitats Directive.

2.1.3.2.2 Nationally Designated Sites

There are no NHAs within the study area but there is a pNHA: Dalkey Coastal Zone and Killiney Hill (Code 001206).

Dalkey Coastal Zone and Killiney Hill pNHA (Code 001206) extends across the northern section of the study area stretching out to sea to Dalkey Island, before tapering back towards the coast northwards to Scotsman Bay. There is another area in the southern section of the study area near Hackettsland.

2.1.3.2.3 Further Constraints for Consideration within CCA2-3

The area selected for designation represents a key habitat for the Annex II species Harbour Porpoise within the Irish Sea. Population survey data show that Porpoise occurrence within the site boundary meets suitable reference values for other designated sites in Ireland. The species occurs year-round within the site and comparatively high group sizes have been recorded. Porpoises with young (i.e., calves) are observed at favourable, typical reference values for the species. Casual and effort-related sighting rates from coastal observation stations are significant for the east coast of Ireland and the latter appear to be relatively stable across all seasons. The selected site contains a wide array of habitats believed to be important for Harbour Porpoise, including inshore shallow sand and mudbanks and rocky reefs scoured by strong current flow. The site also supports Common Seal and Grey Seal, for which terrestrial haul-out sites occur in immediate proximity to the site. Bottlenose Dolphins have also occasionally been recorded in the area.

Dalkey Islands SPA is both a breeding and a staging site for Sterna Terns. The site is one of only three known sites in the country for Roseate Tern (rare species). Birds are present from approximately late-July to September, with c. 2,000 Terns.

2.1.3.3 CCA5 – Bray Head

This section identifies the constraints aspects of the study area in relation to biodiversity. A sensitive receptor in this context relates to the following types of features:

- Designated/protected site e.g., SACs and SPAs; and
- Nationally designated sites e.g., NHAs and pNHAs.

Key sources of information relating to these types of features have been identified with reference to the National Parks and Wildlife Service (NPWS).

The study area extends from Bray southwards down the coastline to Rathdown Upper (refer to Figure 3.1.1 – CCA5; Figure 3.1.2 – CCA5 and Figure 3.2 – CCA5).

2.1.3.3.1 European Sites

Bray Head SAC (Code 000714) has an objective to maintain or restore the favourable conservation condition of the Annex I habitats for which the SAC has been selected. It extends nearly the full length of the study area; some areas cover the seaward side, while there is an area to the south of Bray Golf Course that extends inland towards the R761 by Paddock.

Qualifying Interests are:

- Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]; and
- European dry heaths [4030].

Bray Head is of high conservation importance as it has good examples of two habitats (sea cliffs and dry heath) listed on Annex I of the EU Habitats Directive. It also supports a number of rare plant species and has ornithological importance.

Bray Head has an important seabird colony. Peregrine Falcon, an Annex I species of the EU Birds Directive, breeds at the site, as do Raven and Kestrel.

The heath and grassland habitats at this site are threatened by reclamation for agriculture and also by frequent burning. The site is a popular recreational area and is especially used by walkers.

2.1.3.3.2 Nationally Designated Sites

There are no NHAs within the study area but there is a pNHA: Bray Head pNHA (Code 000714). See SAC above.

2.1.3.3.3 Further Constraints for Consideration within CCA5

Dry heath is the principal habitat over much of Bray Head, but the area is not mapped. Rocky cliffs are divided by the railway track that was built in the 1800s. Rocky, sea cliffs, form most of the seaward boundary and extend for approximately 2km. The lower cliffs are fairly steep in places but above the track they are less steep, and often support heath or dry grassland vegetation.

Bray Head has an important seabird colony. Field data shows that all bird species appear to be avoiding using the existing armoured protection at the toe of the cliff. Peregrine Falcon, an Annex I species of the EU Birds Directive, breeds at the site, as do Raven and Kestrel. Characteristic bird species of the heath areas include Stonechat, Whitethroat, Linnet and Skylark. There was a clear aversion for the use of rip/rap along Bray Head. No birds were seen using these sites for nesting or even resting. This observation of non-use of the artificial defence should be noted.

2.1.3.4 CCA6.1 – Greystones to Newcastle

This section identifies the constraints aspects of the study area in relation to biodiversity (refer to Figure 3.1.1 – CCA6.1; Figure 3.1.2 – CCA6.1 and Figure 3.2 – CCA6.1). A sensitive receptor in this context relates to the following types of features:

- Designated/protected site e.g., SACs and SPAs; and
- Nationally designated sites e.g., NHAs and pNHAs.

Key sources of information relating to these types of features have been identified with reference to NPWS.

2.1.3.4.1 European Sites

The Murrough SPA (Code 004186) has an objective to maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA. It comprises of a coastal wetland complex that stretches for 13km from Kilcoole Station, east of Kilcoole village in the north to Wicklow town in the south and extends inland for up to 1km in places.

The site is a SPA under the EU Birds Directive, of special conservation interest for the following species:

- Red-throated Diver (*Gavia stellata*) [A001];
- Greylag Goose (*Anser anser*) [A043];
- Light-bellied Brent Goose (*Branta bernicla hrota*) [A046];
- Wigeon (*Anas penelope*) [A050];
- Teal (*Anas crecca*) [A052];

Black-headed Gull (*Chroicocephalus ridibundus*) [A179];
Herring Gull (*Larus argentatus*) [A184];
Little Tern (*Sterna albifrons*) [A195]; and
Wetland and Waterbirds [A999].

The EU Birds Directive pays particular attention to wetlands, and as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland and Waterbirds.

The Murrough SPA is an important site for wintering waterbirds, being internationally important.

There is a regular occurrence of Red-throated Diver, Little Egret, Whooper Swan, Greenland White-fronted Goose, Golden Plover, Little Tern, Sandwich Tern, Short-eared Owl and Kingfisher is of note, as these species are listed on Annex I of the EU Birds Directive. Part of the Murrough SPA is a Wildfowl Sanctuary.

The Murrough Wetland SAC (Code 002249) has an objective to maintain or restore the favourable conservation condition of the Annex I habitats for which the SAC has been selected. It is a coastal wetland complex which stretches for 15km from Ballygannon to north of Wicklow town, and in parts, extends inland for up to 1km. A shingle ridge stretches the length of the site and carries the mainline Dublin Wexford railway.

Qualifying Interests are:

Annual vegetation of drift lines [1210];
Perennial vegetation of stony banks [1220];
Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330];
Mediterranean salt meadows (*Juncetalia maritimi*) [1410];
Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210]; and
Alkaline fens [7230].

This site is of importance as it’s the largest coastal wetland complex on the east coast of Ireland. Although much affected by drainage, it still contains a wide range of coastal and freshwater habitats, including six listed on Annex I of the EU Habitats Directive, some of which contain threatened plants. Areas on the site contain a rich invertebrate fauna, including several rarities. It is an important site for both wintering and breeding birds and supports a variety of species listed on Annex I of the EU Birds Directive.

2.1.3.4.2 Nationally Designated Sites

There are no NHAs within the study area but there is a pNHA: Murrough pNHA (Code 000730). See SPA/SAC above.

2.1.3.4.3 Further Constraints for Consideration within CCA6.1

On the seaward side of the shingle bank which runs along, the Murrough Wetlands SAC site drift line vegetation and previously rare and legally protected Oysterplant (*Mertensia maritima*) (Flora (Protection) Order, 1999) has been recorded on the gravelly shore (now considered extinct). Vegetated drift lines can be found along the entire length with perennial vegetation found further south. Salt meadows (*Glauco-Puccinellietalia maritimae*) are located to the west of the rail in line with two distinct and small locations which contain c. 80-100% cover.

The shingle ridge at Kilcoole is a traditional nesting area for Little Tern, and the site now supports one of the largest colonies in the country. Birds nest along the entire stretch of the shoreline. Light-bellied Brent Goose occurs here in internationally important numbers. There are priority habitats along the southern area of the CCA at Newcastle within the East Coast Nature Reserve.

2.1.3.5 CCA6.2 – Newcastle to Wicklow Harbour

This section identifies the constraints aspects of the study area in relation to biodiversity (refer to Figure 3.1.1 – CCA6.2; Figure 3.1.2 – CCA6.2 and Figure 3.2 – CCA6.2). A sensitive receptor in this context relates to the following types of features:

- Designated/ protected site e.g., SACs and SPAs; and
- Nationally designated sites e.g., NHAs and pNHAs.

Key sources of information relating to these types of features have been identified with reference to the National Parks and Wildlife Service (NPWS).

2.1.3.5.1 European Sites

The Murrough SPA (Code 004186) has an objective to maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA. It comprises of a coastal wetland complex that stretches for 13km from Kilcoole Station, east of Kilcoole village in the north to Wicklow town in the south and extends inland for up to 1km in places.

The site is a SPA under the EU Birds Directive, of special conservation interest for the following species:

- Red-throated Diver (*Gavia stellata*) [A001];
- Greylag Goose (*Anser anser*) [A043];
- Light-bellied Brent Goose (*Branta bernicla hrota*) [A046];
- Wigeon (*Anas penelope*) [A050];
- Teal (*Anas crecca*) [A052];
- Black-headed Gull (*Chroicocephalus ridibundus*) [A179];
- Herring Gull (*Larus argentatus*) [A184];
- Little Tern (*Sterna albifrons*) [A195]; and
- Wetland and Waterbirds [A999].

The EU Birds Directive pays particular attention to wetlands, and as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland and Waterbirds.

The Murrough SPA is an important site for wintering waterbirds, being internationally important.

There is a regular occurrence of Red-throated Diver, Little Egret, Whooper Swan, Greenland White-fronted Goose, Golden Plover, Little Tern, Sandwich Tern, Short-eared Owl and Kingfisher is of note as these species are listed on Annex I of the EU Birds Directive. Part of the Murrough SPA is a Wildfowl Sanctuary.

The Murrough Wetland SAC (002249) has an objective to maintain or restore the favourable conservation condition of the Annex I habitats for which the SAC has been selected. It is a coastal wetland complex which stretches for 15 km from Ballygannon to north of Wicklow town, and in parts, extends inland for up to 1km. A shingle ridge stretches the length of the site and carries the mainline Dublin Wexford railway.

Qualifying Interests are:

- Annual vegetation of drift lines [1210];
- Perennial vegetation of stony banks [1220];
- Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330];
- Mediterranean salt meadows (*Juncetalia maritimi*) [1410];
- Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210]; and

Alkaline fens [7230].

This site is of importance as it is the largest coastal wetland complex on the east coast of Ireland. Although greatly affected by drainage, it still contains a wide range of coastal and freshwater habitats, including six listed on Annex I of the EU Habitats Directive, some of which contain threatened plants. Areas on the site contain a rich invertebrate fauna, including several rare species. It is an important site for both wintering and breeding birds and supports a variety of species listed on Annex I of the EU Birds Directive.

2.1.3.5.2 Nationally Designated Sites

There are no NHAs within the study area but there is a pNHA: the Murrough pNHA (Code 000730). See SPA/ SAC above.

2.1.3.5.3 Further Constraints for Consideration within CCA6.2

On the seaward side of the shingle bank that runs along the Murrough Wetlands SAC site, drift line vegetation and previously rare and legally protected Oysterplant (*Mertensia maritima*) (Flora (Protection) Order, 1999) has been recorded on the gravelly shore (now considered extinct). There are drift lines along the entire length and perennial vegetation on the south that covers a notable area. There are salt meadows (*Glauco-Puccinellietalia maritimae)* to the west of the rail line in and around Broadlough Estuary. Mediterranean salt meadows *(Juncetalia maritimi*) with similar distribution to (*Glauco-Puccinellietalia maritimae*) are to the west of the rail line in and around Broadlough Estuary. There are priority habitats along the northern area of the CCA at Newcastle within the East Coast Nature Reserve.

At the southern end of the site, Broad Lough, a brackish, partly tidal lake, has a well-developed saltmarsh community. Light-bellied Brent Goose occurs here in internationally important numbers. Nationally important for Red-throated Diver, Greylag Goose, Wigeon, Teal, Black-headed Gull and Herring Gull. It is probably the most important site in the country for nesting Little Tern and nesting area runs along the entire stretch of the shoreline.

2.2 Soils and Geology

2.2.1 Introduction

This chapter of the assessment identifies the potential geological constraints that the proposed Projects may encounter during the construction and operational phases.

2.2.2 Methodology

The following subsection outlines the legislation and guidelines considered, the information and data sources used, and the adopted methodology for preparing this chapter.

The identification of constraints within the study area and subsequent preparation of this constraints assessment was undertaken in general accordance with the Environmental Protection Agency's (EPA) Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EISs) (EPA 2003); Guidelines on Information to be Contained in Environmental Assessment Reports (EIARs) (EPA 2022); and Guidance on The Management of Contaminated Land and Groundwater at EPA Licensed Sites (EPA 2013). Guidance was also sought from the Institute of Geologists of Ireland's (IGI) Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of an EIS (IGI 2013), and the Institute of Environmental Management and Assessment's (IEMA) A New Perspective on Land and Soils in Environmental Impact Assessment (Institute of Environmental Management and Assessment 2022).

The study area has been split into five coastal cell areas (CCAs) defined as CCA1, CCA2-3, CCA5, CCA6.1 and CCA6.2.

To identify potential geological constraints within the study areas, a preliminary study of the existing soils and geology environment (baseline conditions) of the study area has been undertaken. The baseline conditions in the study areas have been interpreted from the following online databases:

- Department of the Environment, Climate and Communications, Public Data Viewer Series, website: dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228 (Department of the Environment, Climate and Communications, 2023);
- Department of the Environment, Climate and Communications, OPALS Public Viewer, website: dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=da2d9d49c3364f84a0f46ad0da0eeee8 (Department of the Environment, Climate and Communications, 2023);
- Environmental Protection Agency (EPA), Maps, website: gis.epa.ie/EPAMaps/default (Environmental Protection Agency Ireland, 2023);
- Geological Survey Ireland, Data and Maps, website: www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx (Geological Survey Ireland, 2023);
- Government of Ireland, GeoHive Map Viewer, website: webapps.geohive.ie/mapviewer/index.html (Government of Ireland, 2023); and
- Ordnance Survey Ireland (OSI), National Townland and Historical Map Viewer, website: osi.maps.arcgis.com/apps/webappviewer/index.html?id=bc56a1cf08844a2aa2609aa92e89497e.

Geological and environmental features have been identified as constraints based on their potential sensitivity/significance or their potential geotechnical or geo-environmental impact, in accordance with EPA's Advice Notes on Current Practice in the Preparation of EISs (EPA 2003).

Parts of the study area were shown to be at risk from radon gas and there are potential sources of ground gas (e.g., peat, made ground and former quarries). During the construction phase risks may involve inhalation by workers or others and potential for explosions. Mitigation measures will include monitoring and the use of personal protection equipment (PPE) as a last result. No buildings or confined spaces are proposed as part of the Project. Therefore, radon gas and ground gas are unlikely to be constraints during operation. However, should designs for the proposed scheme change to include confined spaces, the risks from radon gas and ground gas should be reconsidered.

2.2.3 Constraints per CCA

2.2.3.1 CCA1 – Merrion Gates to Dún Laoghaire

The assessment has identified the following constraints within CCA1 (refer to Figure 7.1 - CCA1 to Figure 7.4 - CCA1):

- A meltwater channel landform intersects the railway line between Merrion and Booterstown, and a second meltwater channel landform intersects the railway line at Monkstown. Areas of hummocky sand and gravel are located sporadically in the study area at Booterstown and Seapoint. Subglacial striae were identified near Monkstown. These landforms represent locations of variable ground conditions (geotechnical constraint).
- There are sporadic areas of moderate to high landslide susceptibility along the coastline (geotechnical constraint).
- Several Water Framework Directive (WFD) waterbodies intersect the railway line through the cell (environmental constraint).
- Alluvial deposits have been identified in the cell, and typically exhibit soft or loose soils, which are compressible or poorly consolidated (geotechnical constraint).
- Made ground identified within the cell represents a potential source for land contamination (environmental and geotechnical constraint).
- Two geological faults intersect the railway line within the cell. The faults could be reactivated by the works or act as a preferential pathway for land contamination (geotechnical and environmental constraint).
- The Lucan formation and Ballysteen formation are described as a locally important aquifer (environmental constraint).
- One abstraction well is present in the cell (environmental constraint).
- Moderate to extreme levels of groundwater vulnerability are present within the cell (environmental constraint).
- Blackrock Breccia along the coastline is classified as a Geological Heritage Audited Site (geo-heritage constraint).
- Marine Beach sands and till derived from granite represent a moderate and high potential for granular aggregate potential respectively (geo-economic constraint).
- The Lucan formation, Ballysteen formation and Type 2p microcline formation have a moderate to high crushed rock aggregate potential (geo-economic constraint).
- Areas of historic development are clustered at Merrion, Booterstown and Dún Laoghaire. These include unspecified tanks, sewage works, gas works, coal yard and a graveyard. These land uses represent potential sources of land contamination (environmental constraint).

2.2.3.2 CCA2-3 – Dalkey Tunnel to Killiney South

The assessment has identified the following constraints within CCA2-3 (refer to Figure 7.1 – CCA2/3 to Figure 7.4 – CCA2/3):

- Steep topography is noted between Dalkey and Ballybrack (geotechnical constraint).
- Two meltwater channel landforms intersect the railway line at Loughlinstown and Ballybrack, respectively. Subglacial striae were recorded in the northern section from CCA2-3-A to CCA2-3-C. These landforms represent locations of variable ground conditions (geotechnical constraint).
- From CCA2-3-A to CCA2-3-C, the landslide susceptibility is classified as moderate to very high (geotechnical constraint).
- Several EPA surface watercourses intersect the railway line through the cell (environmental constraint).
- Alluvium deposits have been identified in the southern area of the cell and typically exhibit soft or loose soils with low bearing capabilities and are compressible (geotechnical constraint).
- Discrete areas of urban/made ground could represent sources of potential contamination or variable ground conditions (environmental and geotechnical constraint).
- The Maulin formation is identified as a locally important aquifer (environmental constraint).
- Areas of high to extreme groundwater vulnerability occur within the vicinity of Dalkey (environmental constraint).
- A former pit located on the drift cliffs of Killiney and an adit at White Rock, Killiney are present in the vicinity of the railway line (environmental and geotechnical constraint).
- Three mineral localities (two non-metallic and one metallic) are recorded in the cell. The metallic locality is located at White Rock, Killiney and is a former mine (adit). The two non-metallic localities can be found at Dalkey Hill and Strand Road, respectively (geo-economic constraints).
- Till derived from limestones and granites and exposed bedrock are present within the cell. Till derived from limestones have a moderate granular aggregate potential (geo-economic constraint).
- Till derived from granites and exposed bedrock have a high to very high crushed rock aggregate potential (geo-economic constraint).
- Four geological heritage sites are present within the cell (geo-heritage constraint).
- Limited historic and current industrial development is present in the cell. However, one historic water pump is located at Ballybrack, and a current wastewater treatment plant is located at Shanganagh-Bray (environmental constraint).

2.2.3.3 CCA5 – Bray Head

The assessment has identified the following constraints within CCA5 (refer to Figure 7.1 – CCA5 to Figure 7.4 – CCA5):

- Steep topography around the Bray area (geotechnical constraint).
- The subglacial striae in the northern section near Bray could represent locations of variable ground conditions (geotechnical constraint).
- The Bray area has been shown to have a high landslide susceptibility rating (geotechnical constraint).
- A few EPA surface watercourses intersect the railway line through at the southern end of the cell (environmental constraint).
- Urban areas/made ground noted around Bray Head and Greystones, which represent potential sources of contamination and variable ground conditions (environmental and geotechnical constraints).
- Several geological faults and thrusts intersect the railway line within the cell. The faults could be reactivated by the works or act as preferential pathways for contamination (geotechnical and environmental constraint).
- Moderate to extreme areas of groundwater vulnerability are present within the cell (environmental constraint).

- A metallic mineral (gold) locality intercepts the railway line near Greystones (geo-economic constraint).
- Marine Beach sands and gravels have been identified in the cell. The Marine Beach sands and gravel deposits have a moderate to high granular aggregate potential, whilst the Gravels derived from Limestones have a very high potential for granular aggregate (geological constraint).
- The Bray Head formation has a moderate to very high crushed rock aggregate potential (geo-economic constraint).
- Bray Head area has been noted as a Geological Heritage Audited Site (geo-heritage constraint).
- The railway line itself represents a potential source of contamination (environmental constraint).

2.2.3.4 CCA6.1 – Greystones to Newcastle

The assessment has identified the following constraints within CCA6.1 (refer to Figure 7.1 – CCA6.1 to Figure 7.4 – CCA6.1):

- A meltwater channel is located between Knockroe and Ballynerrin. Subglacial striae and hummocky sand and gravels are also present within the cell. These landforms could represent locations of variable ground conditions (geotechnical constraint).
- Discrete areas of moderately high landslide susceptibility were identified in the vicinity of Greystones (geotechnical risk).
- Several surface watercourses intersect the railway line through the cell (environmental constraint).
- Fen peat has been identified in the cell and represents a natural form of carbon storage (environmental constraint).
- Fen peat and alluvium deposits have been identified in the cell, which typically represent soft or loose soils that are compressible or poorly consolidated (geotechnical risk).
- Urban areas/made ground noted around Greystones and Newcastle, which represent potential sources of contamination and locations of variable ground conditions (environmental and geotechnical constraint).
- A number of geological faults intersect the railway line within the cell. The faults could be reactivated by the works or act as preferential pathways for contamination (geotechnical and environmental constraint).
- The gravels beneath Kilpedder are named as a locally important gravel aquifer (environmental constraint).
- A number of domestic abstraction wells are present through the cell (environmental constraint).
- Moderate to extreme areas of groundwater vulnerability are present within the cell (environmental constraint).
- Three pits are recorded within the cell boundary, which could represent potential sources of contamination or variable ground conditions (environmental and geotechnical constraint).
- A metallic mineral (gold) locality intercepts the railway line near Greystone (geoeconomic constraint).
- The Marine Beach sands and gravel deposits and gravels derived from limestone have a moderate to very high granular aggregate potential (geo-economic constraint).
- The Bray Head Formation have a moderate to very high crushed rock aggregate potential (geo-economic constraint).
- The Marine Beach Sands along the coastline are identified as a Geological Heritage Audited Site (geo-heritage constraint).
- A few waste facilities were noted within the cell (Dump site boundaries – Department of Agriculture, Fisheries and Forestry (DAFF) Permit near Greystone's Waste Boundary- located near Knockroe, Section 4 discharge - located near Kindlestown Lower) (environmental constraint).

Clusters of historic and current industrial land uses are present in the developed areas of Greystone Kilcoole and Newcastle. These include sewage works, tramways and historic mills. These land uses represent potential sources of contamination and munitions (environmental constraint).

2.2.3.5 CCA6.2 – Newcastle to Wicklow Harbour

The assessment has identified the following constraints within CCA6.2 (refer to Figure 7.1 – CCA6.2 to Figure 7.4 – CCA6.2):

Steep topography is present within the vicinity of Wicklow and Rathnew towns (geotechnical constraint).

A meltwater channel landform intersects the railway line between Wicklow and Rathnew towns. Hummocky sand and gravels and streamlined bedrock have also been recorded in the cell boundary. These landforms could represent locations of variable ground conditions (geotechnical constraint).

The Rathnew and Wicklow areas are shown to have moderately low to moderately high landslide susceptibility ratings. There are also records of past landslide events in these areas (geotechnical constraint).

Several surface watercourses intersect the railway line through the cell (environmental constraint).

Fen peat has been identified in the cell and represents a natural form of carbon storage (environmental constraint).

Fen peat and alluvium deposits have been identified in the cell, which typically represent soft or loose soils that are compressible or poorly consolidated (geotechnical risk).

Urban made ground has been identified within the cell at Wicklow, which could represent potential sources of contamination and locations of variable ground conditions (environmental and geotechnical constraints).

A number of geological faults intersect the railway line within the cell. The faults could be reactivated by the works or act as preferential pathways for contamination (geotechnical and environmental constraint).

Maulin Formation is identified as a locally important aquifer (environmental constraint).

A number of domestic abstraction wells are present through the cell (environmental constraint).

Moderate to extreme areas of groundwater vulnerability are present within the cell (environmental constraint).

Former pits are present in the vicinity of the railway line, which represent potential sources of contamination and locations of variable ground conditions (environmental and geotechnical risk).

The Marine beach sands and gravel deposits have a moderate to high granular aggregate potential (geo-economic constraint).

The Bray Head Formation and Wicklow Head Formation have a moderate to very high crushed rock aggregate potential (geo-economic constraint).

The Marine Beach Sands along the coastline are identified as a Geological Heritage Audited Site (geo-heritage constraint) and County Geological Site (CGS). CGS are protected under the relevant county development plan.

Clusters of historic and current industrial land uses are present in the developed areas of Newcastle, Rathnew and Wicklow towns. These include gun platforms, militia barracks, railway land, dock land, a gasworks and an airport. These land uses represent potential sources of contamination and munitions (environmental constraint).

2.3 Waste

2.3.1 Introduction

Waste management planning in Ireland is undertaken on a regional and national basis. All of the five study areas are located within the Eastern - Midlands Waste Region and fall under the requirements of the Eastern - Midlands Region Waste Management Plan 2015-2021.

The Draft National Waste Management Plan for a Circular Economy has recently undergone public consultation which ended in July 2023. This national plan will supersede the regional plans, once adopted, and will cover the period from 2023 to 2029. It is focused on the transition to more sustainable waste management practices and more circularity in the use and management of materials, in order to reduce waste. A Waste Action Plan for a Circular Economy – Ireland's National Waste Policy 2020-2025 (Department of Communications, Climate Action and Environment (DCCAE) 2020) was published in 2020 and included a measure to create a new national waste management plan to replace the three separate regional plans, with the Regional Waste Management Offices to remain the primary decision makers for waste management planning operational issues.

The circular economy model aims to keep resources in use for as long as possible in order to extract the maximum value from them. The model as shown in the Draft National Waste Management Plan for a Circular Economy is below at Picture 2-1.

Picture 2-1: Circular Economy Model (Source: Draft National Waste Management Plan for a Circular Economy)

In addition to the above waste management documentation, other relevant plans and legislation includes:

- Waste Management Act 1996;
- Circular Economy and Miscellaneous Provisions Act 2022;
- National Hazardous Waste Management Plan 2021-2027;
- Waste Framework Directive;
- Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition (C & D) Projects; and

- Construction and Demolition Waste, Soil and Stone Recovery/Disposal Capacity – Updated report 2020.

Given that waste management information is published by the EPA on a national basis, the below summarises some of the key waste management statistics as reported by the EPA for 2020 (the most recent statistics available):

- The quantity of C&D waste generated in Ireland in 2020 was 8.2 million tonnes, which comprised:
  - Soils, stones and dredging spoil (84.4%);
  - Concrete, brick, tile and gypsum (6.4%);
  - Mixed C&D waste (4.6%);
  - Metal (2.4%);
  - Bituminous mixtures (1.6%); and
  - Segregated wood, glass and plastic (0.6%).
- 95% of that C&D waste underwent final treatment in Ireland, with the other 5% being exported abroad for treatment;
- 82% of the C&D waste was backfilled, 8% was recycled and 10% sent for disposal. The large proportion of backfilling reflects the fact that the majority of C&D waste generated was soil and stone;
- Recycling was the main management route for metals, segregated wood, paper, glass and plastic, and bituminous mixtures; and
- 78% material recovery of C&D waste was achieved, surpassing the 70% Waste Framework Directive (WFD) target.

2.3.2 Methodology

Waste from within the study areas could be accepted at sites nationally or internationally for treatment; recovery and disposal, and therefore this topic, differs from the others in that it does not fit into the study area model. The following information sources were used to identify any potential waste constraints within each CCA study area:

- EPA Online Mapper (EPA 2023);
- Local Authority Waste Facility Register on the National Waste Collection Permit Office (NWCPO) website (NWCPO 2023); and
- Eastern – Midlands Region Waste Management Plan 2015-2021, Appendix F Legacy and Historic Landfills.

2.3.3 Constraints per CCA

As the potential waste management measures for future developments will be largely the same for all of the CCAs, the following sections highlight any specific waste management locations or former waste management sites within each study area.

2.3.3.1 CCA1 – Merrion Gates to Dún Laoghaire

This study area is very urban in character. There are no operational EPA licensed or DCC/DLRCC permitted waste management facilities located within this study area.

There are no historic landfills on the European Metal Recycling (EMR) Waste Management Plan list of historic landfills within this study area.

There are no offshore dump sites identified by the EPA within this study area.

2.3.3.2 CCA2-3 – Dalkey Tunnel to Killiney South

This study area is suburban in character and largely encompasses the coastal area of Killiney Hill and Killiney Beach. Therefore, there are no operational EPA licensed or DLRCC permitted waste management facilities located within this study area.

There are no historic landfills on the EMR Waste Management Plan list of historic landfills within this study area.

There are no offshore dump sites identified by the EPA within this study area.

2.3.3.3 CCA5 – Bray Head

This study area is suburban in character and largely encompasses the coastal part of Bray Head. Therefore, there are no operational EPA licensed or Wicklow County Council permitted waste management facilities within this study area.

There are no historic landfills on the EMR Waste Management Plan list of historic landfills within this study area; however, the site of an old Local Authority landfill exists in the southern end of the study area. This landfill location has been remediated and turned into a public park (Greystones Marina Park). The remediation included the removal of approximately 9,000m^3 of existing landfill material, and sealing of the old landfill using geo-synthetic lining and cell capping material (Sisk Case Study on their website[2]).

There are no offshore dump sites within this study area.

2.3.3.4 CCA6.1 – Greystones to Newcastle

The northern end of this study area is suburban in character, becoming more rural to the south of Kilcoole. There are no operational EPA licensed or Wicklow County Council permitted waste management facilities within this study area. There is existing planning permission for an inert subsoil and topsoil landfill facility (Planning Reference 17480) in Ballydonerea, just north-east of Kilcoole village; however, there is no existing licence or permit from either the EPA or WCC associated with this facility, and it appears that waste activities have not yet commenced at the site.

There is one facility shown on the EPA Online Mapper within the study area, located just along the western study area boundary between Greystones and Kilcoole (Pretty Bush Waste Soils Recovery Facility (Registration Number W0294-01)). The application for a licence for this facility was for the placement of surplus dredge spoil from flood defence works being undertaken on the River Dargle in Bray; however, the planning application for the site was rejected by An Bord Pleanála and therefore the application for the waste licence was withdrawn by Wicklow County Council prior to any licence being granted, and the site has never been operational.

There is one site listed in the EMR Waste Management Plan list of historic landfills which may be within the study area. The listing (S22-02626) only gives the location as Kilcoole, so it is unclear of the exact location of this site; if it is west of Kilcoole, it may be outside of the study area. The site is given the risk categorisation of C, which is the lowest risk rating.

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[2] www.johnsiskandson.com/case-studies/greystones-marina

In addition to the Kilcoole legacy landfill site, there is also the Greystones Marina Park old landfill site, as described with respect to CCA5. This is located in the northern end of the study area where there is an overlap with the CCA5 study area.

According to the EPA Online Mapper, there is an inactive Dumping at Sea site within the study area located just off the coast near the Greystones Driving Range. The site operated under Permit 205 in 1994, where dredged material was dumped.

2.3.3.5 CCA6.2 – Newcastle to Wicklow Harbour

This study area is largely rural in character, becoming more urban towards Wicklow Town and Rathnew in the southern end of the study area. There are no operational EPA licensed waste management facilities within the study area; however, there are two facilities with Waste Facility Permits from Wicklow County Council which operate in the southern end of the study area within The Murrough in Wicklow Town, namely:

- Multimetals Recycling Limited (Permit Number WFP-WW-09-0014-06), which handles scrap metal from end of life vehicles, waste vehicles and waste electrical and electronic equipment (WEEE); and
- Hanley Removals Limited (Permit Number WFP-WW-21-0063-01), which receives, stores and transfers non-hazardous wastes for disposal at other non-landfill facilities.

There are no historic landfills on the EMR Waste Management Plan list of historic landfills within this study area.

There are no offshore dump sites identified by the EPA within this study area.

2.4 Hydrogeology

2.4.1 Introduction

This section identifies the constraints aspects of the study area in relation to groundwater. Any changes to groundwater levels, flows and quality can impact both the aquifers themselves but also the secondary receptors, which rely on groundwater in order to function. A sensitive receptor in this context relates to the following types of features:

- Aquifers with regional or local importance;
- Abstractions (public and private), including any associated inner and outer protection areas;
- Groundwater Dependent Terrestrial Ecosystems (GWDTE) and/or wetlands where groundwater is one of the main inputs; and
- Groundwater features, such as wells and springs which may be utilised as a water resource.

2.4.2 Methodology

The following sources were used to identify any hydrogeological constraints in each area:

- Geological Survey Ireland (GSI) – groundwater data viewer;
- Nature reserves – data.gov.ie; and
- Ramsar wetland sites – data.gov.ie.

2.4.3 Constraints per CCA

2.4.3.1 CCA1 – Merrion Gates to Dún Laoghaire

Within the study area there is limited groundwater data, with one potential borehole at Merrion according to the GSI dataset. Along the coast, the bedrock is at or near the surface, resulting in the aquifer having the highest vulnerability to contamination.

From a groundwater perspective, there are no potential GWDTE or wetland areas with a designation within the study area, i.e., that would depend on groundwater contributions. The South Dublin Bay SAC is expected to be a coastal environment where groundwater could discharge but would not classify as GWDTE.

2.4.3.2 CCA2-3 – Dalkey Tunnel to Killiney South

Within the study area there are limited groundwater constraints, due to the lack of groundwater receptors such as wells, springs and designated sites/potential wetland areas.

However, groundwater is vulnerable along the coast due to the rock being at/near the surface, resulting in the aquifer having the highest vulnerability to contamination. In the south, groundwater is less vulnerable but still remains at high to low vulnerability.

2.4.3.3 CCA5 – Bray Head

Within the study area are two potential boreholes in the north which appear to be used for domestic supply according the GSI dataset. There is also a mapped spring which potentially lies within the study area. Additionally, groundwater is vulnerable to contamination along the coast due to the rock being at/near the surface. In the south this vulnerability is reduced, however it still remains between high and moderate.

From a groundwater perspective, there are no potential GWDTE or wetland areas within the study area that would depend on groundwater contributions. This included Bray Head SAC, which is a sea cliff environment and unlikely to depend on groundwater.

2.4.3.4 CCA6.1 – Greystones to Newcastle

According to the GSI dataset there are multiple boreholes spread across the study area, the majority of which seem to be used for domestic purposes, with a few unknown purposes.

The Murrough Wetland SAC is present to the south of the study area, adjacent to the railway line, and has the potential to contain shallow groundwater feeding GWDTE. The SAC is described as containing alkaline fen and contains a SSCO SAC habitat of calcareous fens within the SAC to the south of the study area. Fens are typically supported by a shallow groundwater table and can be sensitive to changes in their habitats.

The majority of the study area has groundwater vulnerability classed as high to low; however, there are localised areas of extreme vulnerability and areas where the rock is at/near the surface, which means that it is very vulnerable to contamination.

2.4.3.5 CCA6.2 – Newcastle to Wicklow Harbour

Within the study area there are multiple boreholes used for domestic purposes and unknown reasons according the GSI dataset. However, one of these supplies is described as a public water supply (in Merrymeeting).

The Murrough Wetland SAC is present along the majority of the eastern part of the study area, adjacent to the railway line, and has the potential to contain shallow groundwater feeding GWDTE. The SAC is described as containing alkaline fen and contains a SSCO SAC habitat of calcareous fens within the SAC to the south of the study area and Saltmarsh habitats (Atlantic salt meadow and potential Atlantic salt meadow) to the south and east. Fens are typically supported by a shallow groundwater table and can be sensitive to changes in their habitats. Additionally, saltmarsh habitats can also be reliant on groundwater contributions.

The majority of the study area has groundwater vulnerability classed as moderate to low in the north. However, there are localised areas where the rock is at/near the surface which means that it is very vulnerable to contamination, to the west and south.

2.5 Hydrology

2.5.1 Introduction

This section identifies constraints in relation to hydrology. Sensitive receptors for surface water are considered to be:

Surface waters used for abstraction purposes;
Surface waters with ecological significance; and
Areas prone to flooding .

2.5.2 Methodology

Using the following data sources key constraints have been identified:

EPA GIS Maps; and
OPW Flood Mapping.

2.5.3 Constraints per CCA

2.5.3.1 CCA1 – Merrion Gates to Dún Laoghaire

2.5.3.1.1 Waterbodies

There is one river sub-basin and one coastal waterbody as outlined in Table 2-1 and Table 2-2. There are no transitional waterbodies at this location (refer to Figure 4.5 - CCA1).

Table 2-1: CCA1 River Sub-Basins

River Sub-Basin	WFD Code	River Waterbody WFD Status 2016-2021	WFD Risk
BREWERY STREAM_010	IE_EA_09B130400	Poor (Low Confidence)	Review

Table 2-2: CCA1 Transitional and Coastal Waterbodies

Waterbody Type	Waterbody	WFD Code	River Waterbody WFD Status 2016-2021	WFD Risk
Coastal	Dublin Bay	IE_EA_090_0000	Good (High Confidence)	Not at Risk

2.5.3.1.2 Flood Risk

A review of flood mapping prepared by the OPW (www.floodinfo.ie) identifies that there are areas throughout CCA1 (refer to Figure 4.1 - CCA1 to Figure 4.4 - CCA1) that are subject to flood risk and these areas are:

Coastal and River Flooding in the vicinity of Merrion Gates;
Flooding in the Blackrock area associated with the Brewery Stream; and
Flooding at Brighton Vale and Monkstown.

2.5.3.2 CCA2-3 – Dalkey Tunnel to Killiney South

2.5.3.2.1 Waterbodies

There are two river sub-basins and two coastal waterbodies, as outlined in Table 2-3 and Table 2-4. There are no transitional waterbodies at this location (refer to Figure 4.5 – CCA2/3).

Table 2-3: CCA2-3 River Sub-Basins

River Sub-Basin	WFD Code	River Waterbody WFD Status 2016-2021	WFD Risk
KILL OF THE GRANGE STREAM_010	IE_EA_10K020200	Poor (Medium Confidence)	At Risk
SHANGANAGH_010	IE_EA_10S010600	Good (High Confidence)	Not at Risk

Table 2-4: CCA2-3 Transitional and Coastal Waterbodies

Waterbody Type	Waterbody	WFD Code	River Waterbody WFD Status 2016-2021	WFD Risk
Coastal	Irish Sea Dublin (HA 09)	IE_EA_070_0000	Good (Medium Confidence)	Not at Risk
Coastal	Southwestern Irish Sea - Killiney Bay (HA10)	IE_EA_100_0000	High (High Confidence)	Not at Risk

2.5.3.2.2 Flood Risk

A review of flood mapping prepared by the OPW (www.floodinfo.ie) identifies that there is one area in CCA2/3 (refer to Figure 4.1 – CCA2/3 to Figure 4.4 – CCA2/3) that is subject to flood risk, and this is:

Flooding at Shanganagh along the Shanganagh Stream

2.5.3.3 CCA5 – Bray Head

2.5.3.3.1 Waterbodies

There is one river sub-basin and one coastal waterbody, as outlined in Table 2-5 and Table 2-6. There are no transitional waterbodies at this location (refer to Figure 4.5 – CCA5).

Table 2-5: CCA5 River Sub-Basins

River Sub-Basin	WFD Code	River Waterbody WFD Status 2016-2021	WFD Risk
KILRUDDERY_DEERPARK_010	IE_EA_10K520710	Good (Low Confidence)	Review

Table 2-6: CCA5 Transitional and Coastal Waterbodies

Waterbody Type	Waterbody	WFD Code	River Waterbody WFD Status 2016-2021	WFD Risk
Coastal	Southwestern Irish Sea - Killiney Bay (HA10)	IE_EA_100_0000	High (High Confidence)	Not at Risk

2.5.3.3.2 Flood Risk

A review of flood mapping prepared by the OPW (www.floodinfo.ie) identifies that there are areas throughout CCA5 (refer to Figure 4.1 – CCA5 to Figure 4.4 – CCA5) that are subject to flood risk and these areas are:

Coastal area from Rathdown Upper, just south of Bray Head as far south as Greystones;

2.5.3.4 CCA6.1 – Greystones to Newcastle

2.5.3.4.1 Waterbodies

There are seven river sub-basins, one coastal and one transitional waterbody (refer to Figure 4.5 – CCA6.1) as outlined in Table 2-7 and Table 2-8.

Table 2-7: CCA6.1 River Sub-Basins

River Sub-Basin	WFD Code	River Waterbody WFD Status 2016-2021	WFD Risk
KILRUDDERY_DEERPARK_010	IE_EA_10K520710	Good (Low Confidence)	Review
THREE TROUTS STREAM_010	IE_EA_10T030580	Good (Low Confidence)	Not at Risk
KILCOOLE STREAM_010	IE_EA_10K010580	Poor (Medium Confidence)	At Risk
BALLYRONAN STREAM_010	IE_EA_10B080500	Moderate (High Confidence)	At Risk
NEWTOWNMOUNTKENNEDY_020	IE_EA_10N020600	Moderate (High Confidence)	At Risk
NEWCASTLE (WICKLOW)_010	IE_EA_10N010600	Poor (Medium Confidence)	At Risk
INCHANAPPA_010	IE_EA_10I020430	Good (Low Confidence)	Review

Table 2-8: CCA6.1 Transitional and Coastal Waterbodies

Waterbody Type	Waterbody	WFD Code	River Waterbody WFD Status 2016-2021	WFD Risk
Coastal	Southwestern Irish Sea - Killiney Bay (HA10)	IE_EA_100_0000	High (High Confidence)	Not at Risk
Transitional	Kilcoole Marsh	IE_EA_120_0100	Moderate (n/a)	Review

2.5.3.4.2 Flood Risk

A review of flood mapping prepared by the OPW (www.floodinfo.ie) identifies that there are areas throughout CCA6.1 (refer to Figure 4.1 – CCA6.1 to Figure 4.4 – CCA6.1) that are subject to flood risk and these areas are:

- Coastal area from Greystones as far south as Cobblers Bulk, just east of Ballynerrin; and
- Flooding along the Kilcoole Stream, Ballyronan Stream, Newtownmountkennedy Stream and Newcastle stream flowing into the Murroughs.

2.5.3.5 CCA6.2 – Newcastle to Wicklow Harbour

2.5.3.5.1 Waterbodies

There are five river sub-basins, one coastal and two transitional waterbodies (refer to Figure 4.5 – CCA6.2) as outlined in Table 2-9 and Table 2-10.

Table 2-9: CCA6.2 River Sub-Basins

River Sub-Basin	WFD Code	River Waterbody WFD Status 2016-2021	WFD Risk
NEWCASTLE (WICKLOW)_010	IE_EA_10N010600	Poor (Medium Confidence)	At Risk

River Sub-Basin	WFD Code	River Waterbody WFD Status 2016-2021	WFD Risk
INCHANAPPA_010	IE_EA_10I020430	Good (Low Confidence)	Review
VARTRY_040	IE_EA_10V010300	Moderate (High Confidence)	Review
RATHNEW STREAM_010	IE_EA_10R020600	Good (High Confidence)	Not at Risk
WICKLOW_010	IE_EA_10W080880	Good (Low Confidence)	Review

Table 2-10: CCA6.2 Transitional and Coastal Waterbodies

Waterbody Type	Waterbody	WFD Code	River Waterbody WFD Status 2016-2021	WFD Risk
Coastal	Southwestern Irish Sea - Killiney Bay (HA10)	IE_EA_100_0000	High (High Confidence)	Not at Risk
Transitional	Kilcoole Marsh	IE_EA_120_0100	Moderate (n/a)	Review
Transitional	Broad Lough	IE_EA_130_0100	Moderate (High Confidence)	At Risk

2.5.3.5.2 Flood Risk

A review of flood mapping prepared by the OPW (www.floodinfo.ie) identifies that there are areas throughout CCA6.2 (refer to Figure 4.1 – CCA6.2 to Figure 4.4 – CCA6.2) that are subject to flood risk and these areas are:

- Flooding along the Kilcoole Stream, Ballyronan Stream, Newtownmountkennedy Stream and Newcastle stream flowing into the Murroughs; and
- Flooding along the Vartry River and associated streams flowing into the Broad Lough north of Wicklow town.

2.6 Landscape, Seascape and Visual

2.6.1 Introduction

This section discusses potential landscape constraints within each study area.

2.6.2 Methodology

This section identifies the constraints aspects of the study area in relation to landscape, sea scape and visual amenity. The identification of sensitive receptors in the context of landscape was undertaken by reviewing relevant documentation in order to identify Tree Preservation Orders, Protected views or Prospects and Seascape Character Areas. Relevant data was sourced from the following:

- Dublin City Tree Strategy 2016 – 2020;
- DLR Tree Strategy 2011 – 2015;
- Wicklow County Council Tree Management Policy:
- Dublin City Development Plan 2022-2028;
- Dún Laoghaire Rathdown County Development Plan 2022-2028; and
- The Regional Seascape Character Assessment for Ireland 2020.

2.6.3 Constraints per CCA

2.6.3.1 CCA1 – Merrion Gates to Dún Laoghaire

This section identifies the constraints within the study area in relation to landscape.

There are a number of landscape features which need to be considered. These are outlined in the following sections (refer to Figure 5.1 - CCA1).

- Tree protections, and trees which are subject to Tree Preservation Order (TPO);
- Public rights of way;
- Views or Prospects; and
- Seascape Character Area (SCA).

2.6.3.1.1 Tree Protections

These are outlined in the following sections.

The Dublin City Tree Strategy 2016 sets out a vision for long term planting protection and maintenance of Trees with Dublin City. The Dublin City Development Plan 20122 – 2028 policy GI141 is to protect existing trees as part of new development, particularly those that are of visual, biodiversity or amenity quality and significance. Re will be a presumption in favour of retaining and safeguarding trees that make a valuable contribution to the environment.

It should be noted however that there are no tree preservation orders in the Dublin City area of CCA1.

The Dún Laoghaire-Rathdown County Council (DLRCC) is currently updating the DLR Tree Strategy 2011 – 2015, and states that the forthcoming DLR Trees Strategy will include a broader, holistic urban forestry approach, with ambitious goals and targets for conserving and managing the County’s existing, diverse tree population. The Strategy will apply an ecosystems and canopy-focused approach, particularly in respect of urban trees and urban forestry, and will be strongly aligned to the role of trees in climate mitigation and climate adaptation, with related benefits to public health, biodiversity, heritage, and amenity value.

Within the CCA1 study area, there are numerous trees that are afforded the following protection level to protect and preserve Trees and Woodlands. The tree areas exist from West Pier along to the south of Booterstown Park and are situated within green spaces and along road edges within urban areas.

The Development Plan identifies the following policy:

'*Policy Objective OSR7: Trees, Woodland and Forestry. It is a Policy Objective to implement the objectives and policies of the Tree Policy and the forthcoming Tree Strategy for the County, to ensure that the tree cover in the County is managed, and developed to optimise the environmental, climatic and educational benefits, which derive from an 'urban forest', and include a holistic 'urban forestry' approach.*'

The DLRCC states that it will prioritise the making of Tree Preservation Orders (TPOs) based on the judicious selection of trees that meet objective criteria, in accordance with best landscape and arboricultural practices. Criteria will include a significant contribution to local amenity and to the environment (e.g., by providing Ecosystem Services).

One tree has been identified under a TPO within the CCA1 study area, which can be found at Belgrave Square within the green space.

2.6.3.1.2 Public Rights of Way

There are several public rights of ways along the coastline, with views of the Bay and harbour (See Figure 1.3 CCA1). These include:

- Coast Road South;
- Martello Tower, Seapoint, along north side of railway to Coal Quay Bridge;
- Seapoint Avenue to Brighton Vale; and
- Seafort Parade to Williamstown Strand.

2.6.3.1.3 Views and Prospects

The Dublin City Development Plan 2022 – 2028 identifies the importance of retaining the existing key landscapes and open spaces. Policy GI19 in the plan identifies the requirement to *continue to protect and enhance the city's landscape and seascape, the amenities of places and features of natural beauty and interest, through sustainable planning and design for both the existing community and for future generations in accordance with the National Landscape Strategy 2015 – 2025 and any updated strategy.* Policy GI20 *is to protect and enhance views and prospects which contribute to the appreciation of landscape and natural heritage*.

The DLR Development Plan (DLRCC 2022) states that it contains many sites and vantage points from which scenic views over areas of great natural beauty, local landmarks, historic landscapes, adjoining Counties, and the City of Dublin may be obtained. In addition, the County also contains important prospects i.e., prominent landscapes or areas of special amenity value, or special interest which are widely visible from the surrounding area. Specific Views and Prospects for protection have been identified.

It is also recognised that visual linkages between landmarks, landscape features and views exist. Where possible, DLR will seek to improve and retain the viewing potential of existing views and/or prospects.

The County contains important prospects i.e., prominent landscapes or areas of special amenity value, or special interest which are widely visible from the surrounding area.

Policy Objective GIB6 within the DLR Development Plan (DLRCC 2022) states that:

'It is a Policy Objective to preserve, protect and encourage the enjoyment of views and prospects of special amenity value or special interests, and to prevent development, which would block or otherwise interfere with Views and/or Prospects the enjoyment of views and prospects of special amenity value or special interests, and to prevent development, which would block or otherwise interfere with Views and/or Prospects.'

The number of views of relevance are outlined in Table 2-11.

Table 2-11: Views and Prospects in CCA1

Views and Prospects	CCA	Number of Items
View	CCA1	46
Prospect	CCA1	0

The views are along the coastal edge within the following areas:

Seaward side of Seapoint Avenue, views over South Dublin Bay;
Blackrock along Idrone Terrace; and
Booterstown Park Near Willow Terrace northwards along the park towards Trimleston Avenue.

2.6.3.1.4 Seascape Character Areas

Ireland's Seascapes website describes CCA1 is located within Seascape Character Area (SCA) 15 Dublin Bay and this seascape area is described as follows as follows:

'*SCA 15 comprises the distinctive horseshoe bay of Dublin, framed by the elevated quartzite headland of Howth Head, to the north, and Killiney Hill, an elevated granite head to the south. These hard rocks have withstood erosive processes that have otherwise laid low the softer Carboniferous limestone and shales that floor the centre of the bay and underlie Dublin City.*

The character of this seascape is that of a busy and active area, with the busiest port in the country and the capital city. Dublin Bay is relatively shallow. Historically due to its shifting sandbanks it had a reputation of being treacherous for shipping. Frequently ships sailed out of Dublin but, tides would push them back onto its inshore sandbanks, the North Bull and the South Bull. The shifting sandbars and the ongoing silting of the bay and the sandbars have ensured regular interventions to keep the port open.

Dublin Bay has long been exploited as a coastal resource, and although city of Dublin considered as being of Viking origin, archaeological evidence, found particularly on the northern part of this SCA suggest earlier coastal communities. The liminal character of sky, land and sea and its importance for ritual is reflected in the portal tomb at Howth Demesne, in addition to cairns and mounds on the Head of Howth.

The coast of this area is largely urban in character and has been extensively modified to accommodate the growing city. The hinterland is primarily urban in character; however, the Dublin Bay Biosphere designation reflects the importance of the bay for biodiversity.

Whilst heavily urbanised, the bay itself is a popular recreational area, for pleasure boats, and for activities such as kayaking and windsurfing. Popular areas for walking include Howth Head, Bull Island, South Wall, Dún Laoghaire Piers and Killiney Hill. Popular bathing areas include the Forty Foot, the recently reopening Clontarf Baths and the south wall.

Key vistas and landmarks associated with this SCA include the Poolbeg Chimneys, Howth Head, Killiney and Bray Head in the distance.'

2.6.3.2 CCA2-3 – Dalkey Tunnel to Killiney South

This section identifies the constraints within the study area, in relation to landscape.

There are a number of landscape features which need to be considered. These are outlined in the following sections (refer to Figure 5.1 – CCA2/3).

- Trees which are subject to a TPO;
- Public rights of way;
- Views or Prospects; and
- Seascape Character Areas.

2.6.3.2.1 Tree Protections

These are outlined in the following sections.

The Dún Laoghaire-Rathdown County Council (DLRCC) is currently updating the DLR Tree Strategy 2011 – 2015., and states that the forthcoming DLR Trees Strategy will include a broader, holistic urban forestry approach, with ambitious goals and targets for conserving and managing the County's existing, diverse tree population. The Strategy will apply an ecosystems and canopy-focused approach, particularly in respect of urban trees and urban forestry, and will be strongly aligned to the role of trees in climate mitigation and climate adaptation, with related benefits to public health, biodiversity, heritage, and amenity value.

Within the CCA2-3 study area, there are numerous trees that are afforded a level of protection in line with the Local Authority policy to "to protect and preserve trees and woodlands." Theses tree areas are the length of the study area Dalkey to Killiney South.

The Development Plan identifies the following policy:

'*Policy Objective OSR7: Trees, Woodland and Forestry. It is a Policy Objective to implement the objectives and policies of the Tree Policy and the forthcoming Tree Strategy for the County, to ensure that the tree cover in the County is managed, and developed to optimise the environmental, climatic and educational benefits, which derive from an 'urban forest', and include a holistic 'urban forestry' approach.*'

There are no tree preservation orders within the CCA2-3 study area.

2.6.3.2.2 Public Rights of Way

There are several coastal rights of way within the study area (See Figure 1.3 CCA2-3), which include:

- Vico Road to White Rock;
- Killiney Hill Road to Strathmore Road;
- St George's Avenue to Killiney Hill Road;
- Killiney Hill Road to Station Road (amended route);
- Marino Avenue West; and
- Seafield road to Killiney Strand.

2.6.3.2.3 Views and Prospects

The DLR Development Plan (DLRCC 2022) states that it contains many sites and vantage points from which scenic views over areas of great natural beauty, local landmarks, historic landscapes, adjoining Counties, and the City of Dublin may be obtained. In addition, the County also contains important prospects i.e., prominent landscapes or areas of special amenity value, or special interest which are widely visible from the surrounding area. Specific Views and Prospects for protection have been identified.

It is also recognised that visual linkages between landmarks, landscape features and views exist. Where possible, DLR will seek to improve and retain the viewing potential of existing views and/or prospects.

The County contains important prospects i.e., prominent landscapes or areas of special amenity value, or special interest which are widely visible from the surrounding area.

Policy Objective GIB6 within the DLR Development Plan (DLRCC 2022) states that:

'It is a Policy Objective to preserve, protect and encourage the enjoyment of views and prospects of special amenity value or special interests, and to prevent development, which would block or otherwise interfere with Views and/or Prospects the enjoyment of views and prospects of special amenity value or special interests, and to prevent development, which would block or otherwise interfere with Views and/or Prospects.'

To preserve views, those of relevance are outlined in Table 2-12.

Table 2-12: Views and Prospects in CCA2-3

Views and Prospects	CCA	Number of Items
View	CCA2-3	32
Prospect	CCA2-3	2

Along the coastline there are several areas identified, as to preserve prospects.

Two of these areas are within Killiney Hill and referenced as Dalkey Hill from Ulverton Road, Station Road and the East Pier area, with regard to Policy Objective GIB6 Views and Prospects (DLRCC 2022).

2.6.3.2.4 Seascapes Character Areas

From Ireland's Seascapes website

CCA2/3 is located within Seascape Character Area- SCA 15 which also covers Dublin Bay:

Dublin bay comprises of the distinctive horseshoe bay of Dublin, framed by the elevated headland of Howth Head, to the north, and Killiney Hill, to the south. The character of this seascape is that of a busy and active port and city. Dublin Bay is relatively shallow. The coast of this area is largely urban and has been extensively modified to accommodate the growing city. However, despite this the Dublin Bay Biosphere designation reflects the importance of the bay for biodiversity.

2.6.3.2.4.1 Seascape Coastal Type

The coastal type around Dalkey coastline and Dalkey Island are classified as Modified Historic Urban Bay, SCT10; and Broad Estuarine Bays and Complex Lower Plateau and Cliff Coastline, SCT7.

At the southern extend of the study area, the coastal type is noted as Broad Estuarine Bays and Complex Lower Plateau and Cliff Coastline, SCT7.

2.6.3.3 CCA5 – Bray Head

This section identifies the constraints within the study area, in relation to landscape.

There are a number of landscape features which need to be considered. These are outlined in the following sections (refer to Figure 5.1 – CCA5).

Trees, which are subject to a TPO;
Special Amenity Area Order (SAAO);
Views or Prospects;
Landscape Character Areas; and
Seascape Character Areas.

2.6.3.3.1 Tree Preservation Orders

There are large areas of woodland tree preservation orders (TPO B8 Bray Head) within CCA5 to the northern end of the study area.

2.6.3.3.2 Special Amenity Area Order (SAAO)

The Wicklow County Development Plan 2022-2028 states that public access to Bray Head is provided via the cliff walk, which extends from Bray to Greystones and numerous other paths and tracks. Most of this area has been designated as a Special Amenity Area under Section 202 of the Planning and Development Acts. A Special Amenity Area Order (SAAO) is designed to protect areas that are of particularly high amenity value, which are sensitive to intense development pressure, and which cannot be adequately protected by existing planning controls. In both the Local Area Plan for Bray and the County Development Plan, important views and prospects of Bray Head are listed for protection.

2.6.3.3.2.1 Coastal Cell Objectives (Wicklow County Development Plan 2022-2028):

CPO 19.17

1. To protect and enhance Bray Head, in accordance with the SAAO.
2. To maintain and enhance amenity routes on Bray Head and in particular the cliff path from Bray to Greystones.
3. To facilitate the development of services and facilities for visitors such as suitable signage, footpath surfaces, notice and maps, while preserving the rugged and natural character of the area and its paths.
4. To protect all listed views and prospects to or from Bray Head as set out in the Local Area Plan for Bray MD and the County Development Plan.
5. Development, which would reduce existing areas of heathland, maritime grassland and wooded areas, will not normally be permitted except for reasons of overriding public interest.
6. To facilitate existing agricultural usage of Bray Head, in a sustainable and suitable manner, which does not compromise either landscape quality or habitat diversity.
7. To strictly regulate and manage development in this cell to protect its amenity and green break function between the built up area of Bray and Greystones. Within this area, the following restrictions apply: a) Residential development shall be strictly limited to those persons engaged in agriculture in this cell and who can demonstrate a definable economic need to live on the farm holding; b) The highest standards of siting and design will be rigorously enforced for any developments in this area; c) Commercial and industrial development will be prohibited in the cell.
8. To facilitate coastal protection works (natural, soft or hard engineered), to protect both the amenity value of the Cliff Walk and the significant economic and social value of the railway line.

Cell 3 Bray Head to Greystones (Rathdown):

CPO 19.18

1. To strictly regulate and manage development in this cell to protect its function as a green break between the built up area of Bray and Greystones. Within this area, the following restrictions apply:
   a) Residential development shall be strictly limited to those persons engaged in agriculture in this cell and who can demonstrate a definable economic need to live on the farm holding;
   b) The highest standards of siting and design will be rigorously enforced for any developments in this area; and
   c) Commercial and industrial development will be prohibited in the cell.

2. To maintain and enhance the cliff path from Bray to Greystones, while preserving its rugged and natural character.

3. To strictly control the development of new entrances and access driveways on the R761, to those which can be proven to be necessary for either traffic safety reasons or the normal functioning of the landholding.

4. To facilitate coastal protection works (natural, soft and hard engineered), to protect both the amenity value of the Cliff Walk and the significant economic and social value of the railway line.

2.6.3.3.3 Views and Prospects

The Wicklow County Development Plan 2022-2028 identifies prospects of Special Amenity Value or Special Interest run from Bray Head southwards along the coast covering the full length of the study area (Table 2-13 and Table 2-14).

Table 2-13: (Views and Prospects in CCA5)

Views and Prospects	CCA	Number of Items
View	CCA5	0
Prospect	CCA5	1

Table 2-14: (Bray – Greystones Cliff Walk Prospect)

Prospect ID	Origin of	Description
6	Bray-Greystones Cliff Walk	Prospect of sea, cliffs and across southern slopes of Bray Head to R761 from Cliff Walk.

2.6.3.3.4 Landscape Character Areas

The CCA5 study area contains the following Landscape Character areas:

The Bray Mountains Group; This area covers the mountainous area surrounding the town of Bray. These areas are important for their recreation and amenity value. As stated above Bray Head has a 'Special Area Amenity Order' designation;

The Northern Coastline: This area consists of the lands between Wicklow Town and Greystones. This coastline area provides intermittent views of the sea from the coast road with this area being more developed than areas further south. This area includes a number of key environmental features such as the Murrough SAC/SPA (a designated Natura 2000 site) and Natural Heritage Area (NHA). This area is important as a significant recreational resource for the local population; and

Eastern Corridor: This area consists of land either side of the N11 transport corridor.

2.6.3.3.5 Seascape Character Area

The relevant seascape character area (SCA) for CCA5 is the SCA 14 Irish Sea, Sandbanks and Broad Bays. SCA 14 differs from neighbouring areas due to the changing geology, increased elevation and increasing urbanisation and modification of the coast. It includes well known seaside resorts and well represented bays such as Killiney Bay and Bray Head.

This area comprises two main Seascape Character Types; Broad estuarine bay, complex low plateau and cliff coastline, and Shallow offshore waters. Wicklow head with its large lighthouse is a key seascape feature along this SCA, combined with Bray Head; these are the most significant headlands along this part of the coast.

2.6.3.3.5.1 Seascape Coastal Type

The full length of the study area is SCT7 - Broad Estuarine Bays and Complex Low Plateau and Cliff Coastline.

The Wicklow Mountains provide a backdrop with the Great Sugarloaf Mountain (501mOD) clearly visible along the northern section of the SCA. The hinterland comprises towns and suburbs including Wicklow, Greystones and Bray, the main transport corridors of the N11 and railway and Dublin Area Rapid Transit (DART), plus agriculture and forestry further inland.

This SCT includes Dalkey island at its northern extent. Wicklow harbour is the commercial fishing port within this SCT with maritime services, sailing clubs located in Wicklow Port. The shingle bar that was constructed to facilitate the railway line has created the longest coastland wetland in the country at the Murroughs.

2.6.3.4 CCA6.1 – Greystones to Newcastle

This section identifies the constraints within the study area, in relation to landscape.

There are a number of landscape features which need to be considered. These are outlined in the following sections (refer to Figure 5.1 – CCA6.1).

Trees, which are subject to a TPO;
Views or Prospects;
Landscape Character Areas; and
Seascape Character Areas.

2.6.3.4.1 Tree Preservation Orders

The CCA6.1 study area contains an area of TPOs near Kilcoole.

2.6.3.4.2 Views and Prospects

The Wicklow County Development Plan 2022-2028) identifies prospects of Special Amenity Value or Special Interest along the coast, covering the full length of the study area and are as follows; see Table 2-15 and Table 2-16.

Table 2-15: Views and Prospects in CCA6.1

Views and Prospects	CCA	Number of Items
View	CCA6.1	0
Prospect	CCA6.1	2

Table 2-16: Description of Prospects

Prospect ID	Origin of	Description
7	Railway from Greystones to Wicklow town	Prospect of coast along railway line
6	Bray-Greystones Cliff Walk	Prospect of sea, cliffs and across southern slopes of Bray Head to R761 from Cliff Walk

2.6.3.4.3 Landscape Character Areas

The study area has the following Landscape Character areas;

- The Bray Mountains Group; This area covers the mountainous area surrounding the town of Bray. These areas are important for their recreation and amenity value. As stated above Bray Head has a 'Special Area Amenity Order' designation; and
- The Northern Coastline: This area consists of the lands between Wicklow Town and Greystones. This coastline area provides intermittent views of the sea from the coast road with this area being more developed than areas further south. This area includes a number of key environmental features such as the Murrough SAC/SPA (a designated Natura 2000 site) and Natural Heritage Area (NHA). This area is important as a significant recreational resource for the local population.

2.6.3.4.4 Seascape Character Area

CCA6.1 is contained within SCA 14 Irish Sea, Sandbanks and Broad Bays

SCA 14 differentiates from the neighbouring SCAs further south because of its changing geology, increased elevation and ever greater urbanisation due to the influence of the Dublin region. This SCA includes well known seaside resorts and well represented bays such as Killiney Bay and Bray Head.

This area comprises two principal Seascape Character Types;

- Broad estuarine bay, complex low plateau and cliff coastline, and
- Shallow offshore waters.

The India and Codling Banks lie offshore at shallow depths of less than 20m. Wicklow head and Bray Head; are the most significant headlands along this part of the coast. Coastal and inland topography is generally low in elevation within this SCA with the exception of Wicklow Head (82mOD), the adjacent hills (<190mOD) and Collan Hill (238mOD) further south.

2.6.3.4.4.1 Seascape Coastal Type

The full length of the study area is SCT7- Broad Estuarine Bays and Complex Low Plateau And Cliff Coastline. The Wicklow Mountains provide a backdrop with the Great Sugarloaf Mountain (501mOD) clearly visible along the northern section of the SCA. The hinterland comprises towns and suburbs including Wicklow, Greystones and

Bray, the main transport corridors of the N11 and railway and Dublin Area Rapid Transit (DART), plus agriculture and forestry further inland.

This SCT includes Dalkey island at its northern extent. Wicklow harbour is the commercial fishing port within this SCT with maritime services, sailing clubs located in Wicklow Port. The shingle bar that was constructed to facilitate the railway line has created the longest coastland wetland in the country at the Murroughs.

2.6.3.5 CCA6.2 – Newcastle to Wicklow Harbour

This section identifies the constraints within the study area, in relation to landscape.

There are a number of landscape protections and features which need to be considered. These are outlined in the following sections (refer to Figure 5.1 – CCA6.2).

Trees which are subject to a TPO;
Views or Prospects;
Landscape Character Areas; and
Seascape Character Areas.

2.6.3.5.1 Tree Preservation Orders

There are three areas of TPO's towards the southern extent of study area CCA6.2: two near Knowrobin Estate; and one near Glebe.

2.6.3.5.2 Views and Prospects

In regard to views and prospects, Wicklow County Development Plan 2022-2028 identifies Prospects of Special Amenity Value or Special Interest, which runs along the coast, covering the full length of the study area are as outlined in Table 2-17 and Table 2-18.

Table 2-17: Views and Prospects in CCA6.2

Views and Prospects	CCA	Number of items
View	CCA6.2	0
Prospect	CCA6.2	3

Table 2-18: Description of Views and Prospects in CCA6.1

Prospect ID	Origin of	Description
31	R750 Wicklow to Arklow	Prospect towards sea from Coast Road
29	N11 South of Rathnew	Prospect of Murrough and sea
7	Railway from Greystones to Wicklow town	Prospect of coast along railway line

2.6.3.5.3 Landscape Character Areas

The study area has the following Landscape Character areas:

The Northern Coastline: This area consists of the lands between Wicklow Town and Greystones. This coastline area provides intermittent views of the sea from the coast road with this area being more developed than areas further south. This area includes a number of key environmental features such as the Murrough SAC/SPA (a designated Natura 2000 site) and Natural Heritage Area (NHA). This area is important as a significant recreational resource for the local population; and

Eastern Corridor: This area consists of land either side of the N11 transport corridor.

2.6.3.5.4 Seascape Character Area

SCA 14 Irish Sea, Sandbanks and Broad Bays - SCA 14 differentiates from its neighbours due to the changing geology, increased elevation and ever greater influence of the Dublin region as seen through a greater urbanisation and modification of the coast. It includes well known seaside resorts and well represented bays such as Killiney Bay and Bray Head.

This area comprises two principal Seascape Character Types; Broad estuarine bay, complex low plateau and cliff coastline, and Shallow offshore waters. The India and Codling Banks lie offshore at shallow depths of less than 20m.

Wicklow head with its large lighthouse is a key seascape feature along this SCA, combined with Bray Head; these are the most significant headlands along this part of the coast. Historically Bray was a popular town for seaside holidays from Dublin; and has retained its popularity as a site for day trips. Coastal and inland topography is generally low in elevation in this SCA, except at Wicklow Head (82mOD) and the adjacent hills (<190mOD) and Collan Hill (238mOD) further south are the only major elevated features along the coastline.

2.6.3.5.4.1 Seascape Coastal Type

The full length of the study area is SCT7 - Broad Estuarine Bays and Complex Low Plateau and Cliff Coastline.

The Wicklow Mountains provide a montane backdrop, whilst Great Sugarloaf Mountain (501mOD) is a commanding feature along the northern section of the SCA. The hinterland comprises towns and suburbs including Wicklow, Greystones and Bray, the main transport corridors of the N11 and railway and DART plus agriculture and forestry further inland.

Popular coastal walks from Bray to Greystones and the railway has facilitated access along this area since the nineteenth century.

This SCA includes Dalkey island at the northern boundary. Wicklow harbour is the commercial fishing port within this SCA with maritime services, sailing clubs and the Round Ireland Yacht race every two years - a 704 nautical mile race starting and ending in Wicklow Port. The shingle bar that was constructed to facilitate the railway line has created the longest coastland wetland in the country at the Murroughs.

2.7 Archaeology and Cultural Heritage

2.7.1 Introduction

This section discusses potential Archaeology constraints that are considered sensitive receptors within each study area.

2.7.2 Methodology

Currently, over 120,000 archaeological sites and monuments are legally protected by way of inclusion in the statutory Record of Monuments and Places (RMP), established under Section 12 of the National Monuments (Amendment) Act 1994 (DHLGH/OPR, 2021, p.4). The RMP comprises a list of recorded monuments and places and accompanying maps on which such monuments and places are shown for each county (National Monuments Service 2023). The relevant county list and map were consulted for this constraints study and any Recorded Monuments identified inside the study area are listed below in Table 2-19.

The Sites and Monuments Record (SMR) was also consulted through the Historic Environment Viewer (HEV) (Government of Ireland 2023). The relevant SMR dataset and Zones of Notification were downloaded and imported into the Projects' Geographical Information System (GIS) database.

A desktop study was also carried out. The desktop study aimed to identify, as far as reasonably practical, the known and potential cultural heritage assets within the study area for the scheme, highlighting those that are likely to be key constraints for the project.

2.7.3 Constraints per CCA

2.7.3.1 CCA1 – Merrion Gates to Dún Laoghaire

2.7.3.1.1 Recorded Monuments and SMR Sites

There are no Recorded Monuments within CCA1. There are 16 SMR sites within CCA1 (refer to Figure 6.1 - CCA1 and Figure 6.2 - CCA1). See Table 2-19.

Table 2-19: Recorded Monuments and SMR Sites within CCA1

SMR No.	Classification	Status	Proposed for Next RMP	ITM_E	ITM_N	Townland
DU023-010	Martello tower	SMR	Yes	722662	729085	SEAPOINT OR TEMPLEHILL
DU023-048	Castle - unclassified	SMR	No	722260	729222	SEAPOINT OR TEMPLEHILL
DU023-053001	Church	SMR	Yes	719797	730588	MERRION (Dublin By.)
DU023-053002	Graveyard	SMR	Yes	719800	730584	MERRION (Dublin By.)
DU023-005	Cross	SMR	Yes	721506	729422	NEWTOWN, BLACKROCK
DU023-008	Castle - unclassified	SMR	Yes	721980	729174	NEWTOWN, BLACKROCK
DU023-009	Ritual site - holy well	SMR	Yes	722136	729202	NEWTOWN, BLACKROCK
DU023-002	Martello tower	SMR	Yes	720723	730004	INTAKE
DU023-001001	Castle - tower house	SMR	Yes	719616	730908	MERRION (Dublin By.)
DU023-001003	Armorial plaque	SMR	Yes	719581	730899	MERRION (Dublin By.)
DU023-001004	Stone head	SMR	Yes	719581	730896	MERRION (Dublin By.)
DU023-001005	Fish pond	SMR	Yes	719696	730855	MERRION (Dublin By.)

SMR No.	Classification	Status	Proposed for Next RMP	ITM_E	ITM_N	Townland
DU023-001002	House - 18th century	SMR	Yes	719613	730846	MERRION (Dublin By.)
DU023-052003	Martello tower	SMR	Yes	723875	728946	DÚN LAOGHAIRE
DU023-052001	Promontory fort – coastal	SMR	Yes	723903	728951	DÚN LAOGHAIRE
DU023-052004	Battery	SMR	Yes	723963	729014	DÚN LAOGHAIRE

2.7.3.1.2 Undesignated Key Constraints

There are two historic railway lines within CCA1: Pearse (Westland Row) to Blackrock; and Blackrock to Dún Laoghaire.

There are six historic railway stations within CCA1: Sydney Parade, Merrion, Booterstown, Blackrock, Seapoint and Salthill.

2.7.3.2 CCA2-3 – Dalkey Tunnel to Killiney South

2.7.3.2.1 Recorded Monuments and SMR Sites

There are no Recorded Monuments within CCA2-3. There are 15 SMR sites within CCA2-3 (refer to Figure 6.1 – CCA2/3 and Figure 6.2 – CCA2/3). See Table 2-20.

Table 2-20: Recorded Monuments and SMR Sites within CCA2-3

SMR No.	Classification	Status	Proposed for Next RMP	ITM_E	ITM_N	Townland
DU023-072	Signal tower	SMR	No	726380	726090	DALKEY COMMONS
DU026-012	Battery	SMR	Yes	725908	724860	KILLINEY
DU026-013003	Inscribed stone	SMR	Yes	725703	724363	KILLINEY
DU026-013004	Ritual site - holy tree/bush	SMR	Yes	725703	724361	KILLINEY
DU026-013005	Font	SMR	Yes	725691	724361	KILLINEY
DU026-013006	Cross	SMR	Yes	725702	724362	KILLINEY
DU026-013007	Cross	SMR	Yes	725701	724360	KILLINEY
DU026-013008	Ecclesiastical enclosure	SMR	Yes	725700	724362	KILLINEY
DU026-014001	Martello tower	SMR	Yes	725941	723838	KILLINEY
DU026-014002	Earthwork	SMR	Yes	725949	723824	KILLINEY
DU026-013	Ecclesiastical site	SMR	Yes	725690	724361	KILLINEY
DU026-013001	Church	SMR	Yes	725690	724361	KILLINEY
DU026-013002	Graveyard	SMR	Yes	725704	724361	KILLINEY

SMR No.	Classification	Status	Proposed for Next RMP	ITM_E	ITM_N	Townland
DU026-089	Battery	SMR	Yes	725972	723092	SHANGANAGH
DU026-032	Enclosure	SMR	Yes	725709	722956	SHANGANAGH

2.7.3.2.2 Undesignated Key Constraints

There is one historic railway line within CCA2-3: Dún Laoghaire to Bray.

There is one historic railway station within CCA2-3: Killiney and Ballybrack.

2.7.3.3 CCA5 – Bray Head

2.7.3.3.1 Recorded Monuments and SMR Sites

There are three Recorded Monuments within CCA5, 13 SMR sites, one Redundant Record and one Zone of Notification (ZoN) (refer to Figure 6.1 – CCA5 and Figure 6.2 – CCA5). See Table 2-21.

Table 2-21: Recorded Monuments and SMR Sites within CCA5

SMR No.	Classification	Status	Proposed for Next RMP	ITM_E	ITM_N	Townland
WI008-003	Martello tower	SMR	Yes	727220	718314	BRAY
WI008-004	Church	SMR	Yes	727594	717630	NEWCOURT
WI008-007	Redundant Record	SMR	No	728123	714820	RATHDOWN UPPER
WI008-004001	Ecclesiastical enclosure	SMR	Yes	727594	717629	NEWCOURT
WI008-011	Castle – unclassified	RMP	Yes	728780	713705	RATHDOWN UPPER
WI008-011002	Settlement deserted – medieval	RMP	Yes	728719	713825	RATHDOWN UPPER
WI008-012001	Church	RMP	Yes	728611	713597	RATHDOWN UPPER
WI008-012002	Graveyard	SMR	Yes	728612	713592	RATHDOWN UPPER
WI008-046	Fulacht fia	SMR	Yes	728496	713995	RATHDOWN UPPER
WI008-011001	Moated site	SMR	Yes	728792	713729	RATHDOWN UPPER
WI008-011003	Midden	SMR	Yes	728828	713724	RATHDOWN UPPER
WI008-070	Excavation – miscellaneous	SMR	No	728480	713655	RATHDOWN UPPER
WI008-071	Excavation – miscellaneous	SMR	No	728425	713630	RATHDOWN UPPER
WI008-072	Road - hollow-way	SMR	No	728521	713646	RATHDOWN UPPER

SMR No.	Classification	Status	Proposed for Next RMP	ITM_E	ITM_N	Townland
WI008-073	Zone of Notification	SMR	Yes	N/A	N/A	RATHDOWN UPPER
WI008-074	Kiln - corn-drying	SMR	No	728445	713560	RATHDOWN UPPER

2.7.3.3.2 Undesignated Key Constraints

There is one historic railway line within CCA5: Bray to Wicklow.

2.7.3.4 CCA6.1 – Greystones to Newcastle

2.7.3.4.1 Recorded Monuments and SMR Sites

There are no Recorded Monuments within CCA6.1. There are 96 SMR sites and seven Redundant Records within CCA6.1 (refer to Figure 6.1 – CCA6.1 and Figure 6.2 – CCA6.1).

SMR No.	Classification	Status	Proposed for next RMP	ITM_E	ITM_N	Townland
WI008-046	Fulacht fia	SMR	Yes	728496	713995	RATHDOWN UPPER
WI008-068	Excavation – miscellaneous	SMR	No	728254	713841	TEMPLECARRIG LOWER
WI008-058	Excavation – miscellaneous	SMR	No	728229	713723	TEMPLECARRIG LOWER
WI008-011002	Settlement deserted – medieval	RMP	Yes	728719	713825	RATHDOWN UPPER
WI008-011001	Moated site	SMR	Yes	728792	713729	RATHDOWN UPPER
WI008-011003	Midden	SMR	Yes	728828	713724	RATHDOWN UPPER
WI008-011	Castle – unclassified	RMP	Yes	728780	713705	RATHDOWN UPPER
WI008-070	Excavation – miscellaneous	SMR	No	728480	713655	RATHDOWN UPPER
WI008-072	Road - hollow-way	SMR	No	728521	713646	RATHDOWN UPPER
WI008-071	Excavation – miscellaneous	SMR	No	728425	713630	RATHDOWN UPPER
WI008-012001	Church	RMP	Yes	728611	713597	RATHDOWN UPPER
WI008-012002	Graveyard	SMR	Yes	728612	713592	RATHDOWN UPPER
WI008-073	Ringfort – rath	SMR	Yes	728350	713575	RATHDOWN UPPER
WI008-074	Kiln - corn-drying	SMR	No	728445	713560	RATHDOWN UPPER
WI008-045	Redundant record	SMR	No	728255	713134	COOLAGAD
WI008-018	Ringfort – unclassified	SMR	Yes	728740	712524	RATHDOWN LOWER
WI008-019	Redundant record	SMR	No	728605	712306	RATHDOWN LOWER
WI008-020	Redundant record	SMR	No	728953	712271	RATHDOWN LOWER

SMR No.	Classification	Status	Proposed for next RMP	ITM_E	ITM_N	Townland
WI008-17	Castle - hall-house	SMR	Yes	727847	711779	KINDLESTOWN UPPER
WI013-066001	Burnt spread	SMR	Yes	729661	711397	KILLINCARRIG
WI013-066002	Burnt spread	SMR	Yes	729621	711387	KILLINCARRIG
WI013-074	Fulacht fia	SMR	No	729557	711300	KILLINCARRIG
WI013-005	House - 16th/17th century	SMR	Yes	728627	711238	KILLINCARRIG
WI013-009	Enclosure	SMR	Yes	730162	711001	BALLYNERRIN (Newcastle By., Kilcoole ED)
WI013-087	Fulacht fia	SMR	Yes	730064	711151	KILLINCARRIG
WI013-088	Excavation – miscellaneous	SMR	No	730016	711087	KILLINCARRIG
WI013-089	Excavation - miscellaneous	SMR	No	730040	711081	KILLINCARRIG
WI013-085	Burnt spread	SMR	No	729973	710998	KILLINCARRIG
WI013-086	Burnt spread	SMR	No	729949	710976	KILLINCARRIG
WI013-069	Fulacht fia	SMR	No	729672	710871	KILLINCARRIG
WI013-010	Enclosure	SMR	Yes	730162	710821	BALLYNERRIN (Newcastle By., Kilcoole ED)
WI013-120	Habitation site	SMR	No	729803	710811	KILLINCARRIG
WI013-072	Excavation – miscellaneous	SMR	No	729662	710771	KILLINCARRIG
WI013-119	Earthwork	SMR	Yes	729873	710747	BALLYNERRIN (Newcastle By., Kilcoole ED)
WI013-071	Fulacht fia	SMR	No	729462	710521	CHARLESLAND
WI013-098	Kiln - corn-drying	SMR	No	729257	710514	CHARLESLAND
WI013-083	Burial	SMR	No	729732	710501	CHARLESLAND
WI013-082	Burnt mound	SMR	No	729682	710441	CHARLESLAND
WI013-097	Excavation - miscellaneous	SMR	No	729213	710401	CHARLESLAND
WI013-136	Metalworking site	SMR	No	728538	710389	FARRANKELLY
WI013-137	Cremation pit	SMR	No	728472	710388	FARRANKELLY
WI013-135	Kiln - corn-drying	SMR	No	728537	710367	FARRANKELLY
WI013-081	Burnt mound	SMR	No	729716	710349	CHARLESLAND
WI013-138	Barrow - ditch barrow	SMR	No	728854	710290	FARRANKELLY
WI013-140	Burnt mound	SMR	No	728650	710265	FARRANKELLY
WI013-139	Burnt mound	SMR	Yes	728646	710255	FARRANKELLY

SMR No.	Classification	Status	Proposed for next RMP	ITM_E	ITM_N	Townland
WI013-079	Fulacht fia	SMR	No	729592	710291	CHARLESLAND
WI013-076	Habitation site	SMR	No	729133	710271	CHARLESLAND
WI013-011	Church	SMR	Yes	730300	710226	BALLYNERRIN (Newcastle By., Kilcoole ED)
WI013-011001	Decorated stone	SMR	Yes	730300	710226	BALLYNERRIN (Newcastle By., Kilcoole ED)
WI013-111	Excavation - miscellaneous	SMR	No	729338	710216	CHARLESLAND
WI013-109	Fulacht fia	SMR	No	729447	710213	CHARLESLAND
WI013-110	Fulacht fia	SMR	No	729398	710175	CHARLESLAND
WI013-078	Habitation site	SMR	No	729722	710151	CHARLESLAND
WI013-112	Urn burial	SMR	No	729265	710115	CHARLESLAND
WI013-007002	Enclosure	SMR	No	729467	710069	CHARLESLAND
WI013-007001	Enclosure	SMR	No	729472	710051	CHARLESLAND
WI013-006001	Fulacht fia	SMR	No	729423	710030	CHARLESLAND
WI013-006002	Excavation - miscellaneous	SMR	No	729438	710020	CHARLESLAND
WI013-075	Habitation site	SMR	No	729542	709971	CHARLESLAND
WI013-022	Redundant record	SMR	No	729402	709871	CHARLESLAND
WI013-023	Redundant record	SMR	No	729472	709871	CHARLESLAND
WI013-080	Habitation site	SMR	No	729356	709860	CHARLESLAND
WI013-115	Structure	SMR	No	729033	709806	CHARLESLAND
WI013-113	Cremation pit	SMR	No	729045	709804	CHARLESLAND
WI013-077	Ring-ditch	SMR	No	729043	709801	CHARLESLAND
WI013-114	Structure	SMR	No	729034	709799	CHARLESLAND
WI013-073	Habitation site	SMR	No	728923	709761	FARRANKELLY
WI013-145	Signal tower	SMR	No	730833	709542	BALLYGANNON (Newcastle By.)
WI013-118	Enclosure	SMR	Yes	729959	709313	BALLYNERRIN (Newcastle By., Kilcoole ED)
WI013-126	Ringfort - rath	SMR	Yes	730758	708925	BALLYGANNON (Newcastle By.)
WI013-062001	Bullaun stone (present location)	SMR	Yes	729491	708446	KILCOOLE
WI013-063002	Redundant record	SMR	No	729531	708345	KILCOOLE
WI013-063001	Redundant record	SMR	No	729532	708343	KILCOOLE

SMR No.	Classification	Status	Proposed for next RMP	ITM_E	ITM_N	Townland
WI013-030	Ritual site - holy well	SMR	Yes	729886	708136	KILCOOLE
WI013-029005	Furnace	SMR	No	729734	708104	KILCOOLE
WI013-029007	Burial	SMR	Yes	729729	708066	KILCOOLE
WI013-029003	Font	SMR	Yes	729705	708034	KILCOOLE
WI013-029004	Cross-slab	SMR	Yes	729706	708034	KILCOOLE
WI013-029002	Graveyard	SMR	Yes	729709	708033	KILCOOLE
WI013-029001	Church	SMR	Yes	729706	708032	KILCOOLE
WI013-125	Burnt spread	SMR	Yes	729188	708009	KILCOOLE
WI013-029006	Excavation - miscellaneous	SMR	Yes	729776	707990	KILCOOLE
WI013-094	Excavation - miscellaneous	SMR	No	729869	707318	BALLYCRONE
WI013-064	Moated site	SMR	Yes	730140	707288	BALLYCRONE
WI013-093	Excavation - miscellaneous	SMR	No	729861	707269	BALLYCRONE
WI013-092	Fulacht fia	SMR	Yes	729738	707254	BALLYCRONE
WI013-095	Fulacht fia	SMR	Yes	729879	707230	BALLYCRONE
WI013-036	Enclosure	SMR	Yes	730507	706503	BALLYLOUGHLIN
WI013-034	Enclosure	SMR	Yes	729592	706342	BALLYLOUGHLIN
WI013-035	Enclosure	SMR	Yes	729720	706243	LEABEG MIDDLE
WI013-117	Enclosure	SMR	Yes	729931	705540	LEABEG LOWER
WI013-091	Standing stone	SMR	Yes	729680	705509	LEABEG LOWER
WI019-006	Ringfort – rath	SMR	Yes	729613	704772	NEWCASTLE LOWER
WI019-007	Enclosure	SMR	Yes	729832	704633	NEWCASTLE LOWER
WI019-008	Cist	SMR	Yes	730383	703834	BLACKDITCH (Newcastle By.)
WI019-010	Enclosure	SMR	Yes	730542	703603	BLACKDITCH (Newcastle By.)
WI019-068	Enclosure	SMR	Yes	730360	703337	BLACKDITCH (Newcastle By.)
WI019-069	Enclosure	SMR	Yes	702736	702736	BLACKDITCH (Newcastle By.)

2.7.3.4.2 Undesignated Key Constraints

There is one historic railway line within CCA6.1: Bray to Wicklow.

There are three historic railway stations within CCA6.1: Greystones, Kilcoole and Newcastle.

2.7.3.5 CCA6.2 – Newcastle to Wicklow Harbour

2.7.3.5.1 Recorded Monuments and SMR Sites

There are no Recorded Monuments within CCA6.2. There are 89 SMR sites, five Redundant Records and two ZoNs within CCA6.2 (refer to Figure 6.1 – CCA6.2 and Figure 6.2 – CCA6.2).

SMR No.	Classification	Status	Proposed for next RMP	ITM_E	ITM_N	Townland
WI019-007	Enclosure	SMR	Yes	729832	704633	NEWCASTLE LOWER
WI019-008	Cist	SMR	Yes	730383	703834	BLACKDITCH (Newcastle By.)
WI019-010	Enclosure	SMR	Yes	730542	703603	BLACKDITCH (Newcastle By.)
WI019-068	Enclosure	SMR	Yes	730360	703337	BLACKDITCH (Newcastle By.)
WI019-069	Enclosure	SMR	Yes	702736	702736	BLACKDITCH (Newcastle By.)
WI019-080	Enclosure	SMR	Yes	729901	702088	GRANGE NORTH
WI019-046	Fulacht fia	SMR	Yes	729565	701723	BARNACOYLE BIG
WI019-065	Field system	SMR	Yes	729752	701657	GRANGE NORTH
WI019-048	Fulacht fia	SMR	Yes	729476	701631	BARNACOYLE BIG
WI019-066	Enclosure	SMR	Yes	730004	701162	GRANGE SOUTH
WI019-047	Excavation – miscellaneous	SMR	No	729245	701052	BARNACOYLE BIG
WI019-050	Fulacht fia	SMR	Yes	729190	700919	KILMARTIN
WI019-025	Redundant record	SMR	No	729791	700279	CASTLEGRANGE
WI019-044	Field system	SMR	Yes	729472	700134	BARNACOYLE LITTLE
WI019-041	Enclosure	SMR	Yes	729737	699973	BALLYBLA
WI019-040002	Field system	SMR	Yes	729053	699682	KILLOUGHTER
WI019-024001	Church	SMR	Yes	729339	699616	KILLOUGHTER
WI019-024002	Graveyard	SMR	Yes	729344	699606	KILLOUGHTER
WI019-024	Redundant record	SMR	No	729342	699596	KILLOUGHTER
WI019-024003	Industrial site	SMR	Yes	729371	699589	KILLOUGHTER
WI019-040001	Moated site	SMR	Yes	729089	699556	KILLOUGHTER
WI019-049	Fulacht fia	SMR	Yes	729129	699038	KILLOUGHTER
WI025-047	Fulacht fia	SMR	No	729063	698686	CRONYKEERY
WI025-005001	Kiln - lime	SMR	Yes	730179	698405	CLONMANNAN
WI025-004	Enclosure	SMR	Yes	729417	698390	CLONMANNAN
WI025-005	House - 17th/18th century	SMR	Yes	730177	698352	CLONMANNAN
WI025-046	Fulacht fia	SMR	Yes	728762	697707	CRONYKEERY

SMR No.	Classification	Status	Proposed for next RMP	ITM_E	ITM_N	Townland
WI025-068	Field system	SMR	Yes	728657	696614	NEWRATH
WI025-008	Ringfort – unclassified	SMR	Yes	728942	696474	NEWRATH
WI025-009001	Enclosure	SMR	Yes	728814	696365	NEWRATH
WI025-106	Enclosure	SMR	No	728087	696334	ROSSANA LOWER
WI025-107	Urn burial	SMR	No	728087	696334	ROSSANA LOWER
WI025-108	Cremation pit	SMR	No	728087	696334	ROSSANA LOWER
WI025-009	Field system	SMR	Yes	728843	696315	NEWRATH
WI025-101	Hut site	SMR	No	728069	695994	MILLTOWN NORTH
WI025-102	Hut site	SMR	No	728033	695951	MILLTOWN NORTH
WI025-103	Excavation - miscellaneous	SMR	No	727990	695764	MILLTOWN NORTH
WI025-052	Ring-ditch	SMR	No	727941	695617	MILLTOWN NORTH
WI025-052001	Ring-ditch	SMR	No	727941	695617	MILLTOWN NORTH
WI025-058	Excavation - miscellaneous	SMR	No	727883	695505	MILLTOWN NORTH
WI025-035	Zone of Notification	SMR	Yes	N/A	N/A	MILLTOWN NORTH
WI025-053	Burnt mound	SMR	No	727854	695419	BALLYBEG (Newcastle By.)
WI025-089	Enclosure	SMR	No	730297	695381	KNOCKROBIN
WI025-088001	Font (present location)	SMR	Yes	728795	695375	COMMONS
WI025-010001	Church	SMR	Yes	728907	695344	COMMONS
WI025-010002	Font	SMR	Yes	728907	695344	COMMONS
WI025-010003	Graveyard	SMR	Yes	728910	695333	COMMONS
WI025-090	Excavation - miscellaneous	SMR	Yes	730318	694996	BOLLARNEY NORTH
WI025-011007	Building	SMR	Yes	729922	694976	GLEBE (Newcastle By., Wicklow Rural ED)
WI025-011004	Settlement deserted - medieval	SMR	Yes	729868	694979	KNOCKROBIN,GLEBE (Newcastle By., Wicklow Rural ED)
WI025-011002	Redundant record	SMR	No	729778	694954	GLEBE (Newcastle By., Wicklow Rural ED)
WI025-011003	Redundant record	SMR	No	729777	694954	GLEBE (Newcastle By., Wicklow Rural ED)
WI025-011006	Graveyard	SMR	Yes	729802	694951	GLEBE (Newcastle By., Wicklow Rural ED)

SMR No.	Classification	Status	Proposed for next RMP	ITM_E	ITM_N	Townland
WI025-011001	Church	SMR	Yes	729802	694944	GLEBE (Newcastle By., Wicklow Rural ED)
WI025-104	Hearth	SMR	No	727934	694957	BALLYBEG (Ballinacor South By.)
WI025-085	Habitation site	SMR	Yes	727916	694794	BALLYBEG (Newcastle By.)
WI025-048	Habitation site	SMR	Yes	728093	694715	BALLYBEG (Ballinacor South By.)
WI025-049	Burnt mound	SMR	No	728153	694595	BALLYNABARNY
WI025-055	Fulacht fia	SMR	No	728229	694401	BALLYNABARNY
WI025-056	Habitation site	SMR	No	728215	694187	BALLYNABARNY
WI025-054	Habitation site	SMR	No	728239	694118	BALLYNABARNY
WI025-012002	Religious house - Franciscan friars	SMR	Yes	731186	694074	WICKLOW
WI025-013	Castle - Anglo-Norman masonry castle	SMR	Yes	732231	694077	CORPORATION LANDS
WI025-012012	Promontory fort - coastal	SMR	Yes	732194	694069	CORPORATION LANDS
WI019-038	Prehistoric site - lithic scatter	SMR	Yes	730780	698885	CLONMANNAN
WI025-012	Historic town	SMR	Yes	731409	694022	CORPORATION LANDS, GLEBE (Newcastle By., Wicklow Urban ED), WICKLOW, BALLYNERRIN LOWER, CORPORATION LAND (1st division)
WI025-012001	Castle – motte	SMR	Yes	731199	694367	CORPORATION LAND (1st division)
WI025-012003	Church	SMR	Yes	731240	694282	GLEBE (Newcastle By., Wicklow Urban ED) (Detached portion)
WI025-012004	Graveyard	SMR	Yes	731253	694267	WICKLOW
WI025-012005	Architectural feature	SMR	Yes	731221	694275	GLEBE (Newcastle By., Wicklow Urban ED) (Detached portion)
WI025-012006	Font (present location)	SMR	Yes	731230	694288	GLEBE (Newcastle By., Wicklow Urban ED) (Detached portion)
WI025-012008	Architectural fragment	SMR	Yes	731231	694284	GLEBE (Newcastle By., Wicklow Urban ED) (Detached portion)

SMR No.	Classification	Status	Proposed for next RMP	ITM_E	ITM_N	Townland
WI025-012009	Headstone	SMR	Yes	731238	694275	GLEBE (Newcastle By., Wicklow Urban ED) (Detached portion)
WI025-012010	Headstone	SMR	Yes	731248	694274	GLEBE (Newcastle By., Wicklow Urban ED) (Detached portion)
WI025-012011	Headstone	SMR	Yes	731252	694258	GLEBE (Newcastle By., Wicklow Urban ED) (Detached portion)
WI025-012015	Excavation – miscellaneous	SMR	Yes	731390	694098	WICKLOW
WI025-012016	Habitation site	SMR	Yes	731315	694115	WICKLOW
WI025-061	Fulacht fia	SMR	No	728225	693812	BALLYNABARNY
WI025-073	Kiln - pottery	SMR	No	728334	693794	BALLYNABARNY
WI025-060	Fulacht fia	SMR	No	728243	693795	BALLYNABARNY
WI025-040	Fulacht fia	SMR	Yes	727963	693775	BALLYNABARNY
WI025-064001	Fulacht fia	SMR	Yes	728303	693670	BALLYNABARNY
WI025-074	Excavation - miscellaneous	SMR	Yes	728064	693674	BALLYNABARNY
WI025-078	Excavation - miscellaneous	SMR	No	727987	693663	BALLYNABARNY
WI025-057	Kiln - corn-drying	SMR	No	727966	693662	BALLYNABARNY
WI025-071	Enclosure	SMR	Yes	730721	693630	BALLYNERRIN (Newcastle By., Wicklow Rural ED)
WI025-065	Burial ground	SMR	Yes	731562	693634	BALLYNERRIN LOWER
WI025-014	Cist	SMR	Yes	730473	693523	BALLYNERRIN (Newcastle By., Wicklow Rural ED)
WI025-039	Zone of Notification	SMR	Yes	N/A	N/A	CORPORATION LANDS

2.7.3.5.2 Undesignated Key Constraints

There are two historic railway lines within CCA6.2: Bray to Wicklow and Wicklow to Gorey.

There is one historic railway station CCA6.2: Newcastle.

2.8 Architectural Heritage

2.8.1 Introduction

This section discusses potential architectural heritage constraints that are considered sensitive receptors within each study area.

2.8.2 Methodology

The purpose of the Architectural Heritage section is to highlight recorded sites of architectural heritage significance within the study area. This section identifies the constraints aspects within the study area in relation to architectural heritage. A sensitive receptor in the context of Architectural Heritage relates to the following types of features:

Record of Protected Structures (RPS);
National Inventory of Architectural Heritage (NIAH) - Buildings;
Industrial Heritage Features; and
Architectural Conservation Areas (ACAs)/Candidate Architectural Conservation Areas (cACAs).

The Record of Protected Structures (RPS) in the Development Plans for Dublin City and Dún Laoghaire-Rathdown and Wicklow were consulted for Protected Structures and ACAs inside the CCA1.

The National Inventory of Architectural Heritage (NIAH) Building Survey was consulted through the HEV. The relevant NIAH dataset was downloaded and imported into the Projects' GIS database.

The desktop study aimed to identify, as far as reasonably practical, the known and potential built heritage assets within the study area for the scheme, highlighting those that are likely to be key constraints for the project.

2.8.3 Constraints per CCA

2.8.3.1 CCA1 – Merrion Gates to Dún Laoghaire

2.8.3.1.1 Record of Protected Structures (RPS)

There are a total of 420 RPSs identified within CCA1 and four ACAs, three candidate ACAs and three Industrial Heritage Features within study area CCA1 (See Figure 6.1 CCA1).

2.8.3.1.2 National Inventory of Architectural Heritage (NIAH) -Buildings;

There are no NIAH's within the study area.

2.8.3.1.3 Industrial Heritage Features

The Dún Laoghaire Rathdown Industrial Heritage Survey has identified and mapped the key industrial heritage features in the County.

Policy Objective HER23: Industrial Heritage It is a Policy Objective to:

i. Have regard to those items identified in the Industrial Heritage Survey, when assessing any development proposals.

ii. Identify further sites of industrial heritage significance with a view to assessing them for inclusion in the Record of Protected Structures.

Within the study area are the following Industrial Heritage Features. (see figure 6.1 CAA1)

206 -Milestone, At edge of footpath in Main Street, Blackrock, adjacent to the Blackrock Shopping Centre;
967- Letter Box, Seapoint Avenue at junction with Seafield Avenue; and
968- Gas Lamp, Longford Terrace, Salthill and Monkstown

2.8.3.1.4 Architectural Conservation Areas (ACAs);

There are four ACA's within the study area;

Monkstown;
Vasey Place, De Vesci Terrace, and Willow Bank;
Newtown Villas ,Blackrock; and
Seafort Parade, Rock Road, Blackrock.

Candidate Architectural Conservation Area;

Blackrock Village;
Booterstown Avenue

2.8.3.2 CCA2-3 – Dalkey Tunnel to Killiney South

2.8.3.2.1 Record of Protected Structures (RPS);

There are 87 RPS's within the CAA2-3 study area: (see Figure 6.1 CCA2-3).

Dún Laoghaire Rathdown County Development Plan - Policy Objective HER7 states the following:

> Record of Protected Structures It is a Policy Objective to include those structures that are considered in the opinion of the Planning Authority to be of special architectural, historical, archaeological, artistic, cultural, scientific, technical or social interest in the Record of Protected Structures.

2.8.3.2.2 Industrial Heritage Features.

Dún Laoghaire Rathdown County Development Plan Policy Objective HER23: Industrial Heritage It is a Policy Objective to:

i. Have regard to those items identified in the Industrial Heritage Survey, when assessing any development proposals.
ii. Identify further sites of industrial heritage significance with a view to assessing them for inclusion in the Record of Protected Structures.

Within the study area are the following Industrial Heritage Features. (see Figure 6.1 CCA2-3)

2.8.3.2.3 Architectural Conservation Areas (ACAs);

Dún Laoghaire-Rathdown has a diverse architectural heritage that is reflected in the significant number of areas of special character - which are defined as Architectural Conservation Areas - and the very high number of Protected Structures.

These areas will continue to develop and change but their special character is of great value and worthy of protection. The Planning and Development Act 2000 (as amended) provides the legislative basis for the protection of such areas by facilitating their designation as Architectural Conservation Areas, or ACAs. Under Part

IV of this ACT, an ACA is defined as a place, area, group of structures or townscape, taking account of building lines and heights, that: • is of special architectural, historical, archaeological, artistic, cultural, social or technical interest or value, or • contributes to the appreciation of protected structures: these areas include:

Policy Objective HER13: Architectural Conservation Areas. It is a Policy Objective to:

i. Protect the character and special interest of an area which has been designated as an Architectural Conservation Area (ACA).
ii. Ensure that all development proposals within an ACA be appropriate to the character of the area having regard to the Character Appraisals for each area.
iii. Ensure that any new development or alteration of a building within an ACA or immediately adjoining an ACA is appropriate in terms of the proposed design, including scale, height, mass, density, building lines and materials.
iv. Seek a high quality, sensitive design for any new development(s) that are complementary and/or sympathetic to their context and scale whilst simultaneously encouraging contemporary design which is in harmony with the area. Direction can also be taken from using traditional forms that are then expressed in a contemporary manner rather than a replica of a historic building style.
v. Ensure street furniture is kept to a minimum, is of good design and any redundant street furniture removed.
vi. Seek the retention of all features that contribute to the character of an ACA including boundary walls, railings, soft landscaping, traditional paving and street furniture.

There are three ACA's within the study area;

Dalkey Village;
Vico Road, Sorrento Point, Dalkey; and
Killiney

2.8.3.3 CCA5 – Bray Head

2.8.3.3.1 Record of Protected Structures (RPSs)

There are 10 RPSs within the CCA5 study area (see Figure 6.1 CCA5).

2.8.3.3.2 Industrial Heritage Features

There are no industrial heritage features within CCA5 study area.

2.8.3.3.3 Architectural Conservation Areas (ACAs)

There are no ACAs within CCA5 study area.

2.8.3.4 CCA6.1 – Greystones to Newcastle

2.8.3.4.1 Record of Protected Structures (RPS)

There are 12 RPS's within the CAA6.1 study area: (see Figure 6.1 CAA6.1).

2.8.3.4.2 National Inventory of Architectural Heritage (NIAH) - Buildings

There are 127 NIAHs within the study area. (see Constraints Report Figure 6.1 CCA6.1)

2.8.3.4.3 Industrial Heritage Features

There are no industrial heritage features within CCA6.1 study area.

2.8.3.4.4 Architectural Conservation Area (ACAs)

The following five ACAs are located at the north and south of Greystones (see Figure 6.1 CCA6.1):

The Harbour;
Church Road;
Blacklion;
The Burnby; and
Killincarrig

2.8.3.5 CCA6.2 – Newcastle to Wicklow Harbour

2.8.3.5.1 Record of Protected Structures (RPS)

There are two RPS's within the CAA6.2 study area: (see Figure 6.1 CAA6.2).

2.8.3.5.2 National Inventory of Architectural Heritage (NIAH) - Buildings

There are 98 NIAHs within the study area. (see Constraints Report Figure 6.1 CCA6.2)

2.8.3.5.3 Industrial Heritage Features

There are no industrial heritage features within CCA6.1 study area.

2.8.3.5.4 Architectural Conservation Area (ACAs)

The following five ACAs are located in Wicklow (see Figure 6.1 CCA6.1):

Brickfield;
Leitrim Place;
Bachelor's Walk;
Town Centre; and
Bayview Road

2.9 Air Quality and Climate

2.9.1 Introduction

This section of the report outlines constraints of the the Projects relative to air quality and climate. Air quality is not predicted to be negatively impacted during the operational phase; therefore, this section of the report focuses on potential impacts on sensitive receptors within each CCA during construction.

The Ambient Air Quality and Cleaner Air for Europe (CAFE) Directive (2008/50/EC) (hereafter referred to as the CAFE Directive) was published by the European Commission in 2008. The CAFE Directive was transposed into Irish legislation by the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011) (hereafter referred to as the Air Quality Regulations). As part of the requirements of this legislation, four air quality zones were identified for the purpose of managing air quality in Ireland. The four air quality zones are:

- **Zone A:** Dublin;
- **Zone B**: Cork;
- **Zone C:** Other cities and large towns comprising Limerick, Galway, Waterford, Drogheda, Dundalk, Bray, Navan, Ennis, Tralee, Kilkenny, Carlow, Naas, Sligo, Newbridge, Mullingar, Wexford, Letterkenny, Athlone, Celbridge, Clonmel, Balbriggan, Greystones, Leixlip and Portlaoise; and
- **Zone D:** Rural Ireland i.e., the remainder of the State excluding Zones A, B and C.

The main pollutants of concern for air quality in Ireland are associated with combustion emissions typically arising from road traffic, domestic solid fuel burning, electricity generating stations, and industry, which are primarily oxides of nitrogen (NO_x), NO_2 and PM_{10} and $PM_{2.5}$. Air pollutants can affect human health and cause damage to sensitive plants and ecosystems. Air quality also refers to dust, which could affect health or give rise to annoyance due to the soiling of surfaces through deposition. The term “dust” refers to all particulate matter, including all solid particles suspended in air or settled and deposited on a surface after having been suspended in air, due to activities such as construction, demolition and mineral excavation. This includes the smaller-sized particles associated with potential health impacts (i.e., PM_{10} and $PM_{2.5}$), and the larger particles associated with causing annoyance or affecting sensitive vegetation through deposition on a surface.

The Climate Action Plan 2023 (CAP23) was prepared under the Climate Action and Low Carbon Development (Amendment) Act 2021 and introduced economy-wide carbon budgets and sectoral emissions ceilings in 2022. CAP 2023 sets out a roadmap for taking decisive action to halve Ireland’s emissions by 2030 and reach net zero no later than 2050, as committed to in the Programme for Government. It also sets out how Ireland can accelerate the actions that are required to respond to the climate crisis, putting climate solutions at the centre of Ireland’s social and economic development (DECC 2022).

2.9.2 Methodology

The purpose of this Air Quality and Climate section is to highlight receptors sensitive to air quality within the constraints study area. Sensitive receptors can be both human receptors and sensitive designated habitats.

As per the Transport Infrastructure Ireland (TII) Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (hereafter referred to as the TII Air Quality Guidelines), sensitive receptors include:

- Residential properties and gardens;
- Designated Habitats and Ecologically Sensitive Areas;
- Hospitals;

- Schools;
- Care Homes;
- Hotels and B&B's;
- Place of Worship;
- Sports Centres;
- Shopping Areas;
- Playing Fields;
- Cyclists; and
- Outdoor locations including car parks, bus stations, railway stations.

A desktop study was carried out to identify, as far a reasonably practical, sensitive receptors within the constraints study area, highlighting those that are likely to be key constraints for the proposed Project. As part of the data gathering and preparation of this report, the TII Air Quality Guidelines have been considered. This has been done by identifying sensitive receptors as defined by the Guidelines, and determining the existing baseline air quality data that was available. The following sections will discuss the baseline conditions, sensitive receptors and constraints at each CCA.

2.9.3 Constraints per CCA

Baseline air pollutant concentrations are likely to vary between the CCAs, given the difference between the settings of CCA1, CCA2-3, CCA5, CCA6.1 and CCA6.2. CCA1 is located in south Dublin suburbs in a heavily populated urban area. CCAs located further south, such as CCA6.1 and CCA6.2, are located in a more rural setting albeit adjacent to the M11 Motorway and the Dublin-Wexford railway line.

There are air quality sensitive receptors within the constraint study areas for all CCAs, the majority of which are:

- Residential Properties;
- Designated Habitats (e.g., SAC or SPA) and Ecologically Sensitive Areas;
- Amenity/Recreational Areas;
- Educational Facilities; and
- Healthcare Facilities.

Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on Ambient Air Quality and Cleaner Air for Europe (referred to as the CAFE Directive) sets annual mean limit values for a number of air pollutants. In the case of particulate matter (PM), those limits are an annual mean of 40µg/m^3 for PM_{10} and 25µg/m^3 for $PM_{2.5}$. In the case of PM_{10}, there is an additional 24-hour limit set at 50µg/m^3, which is not to be exceeded more than 35 times per year.

2.9.3.1 CCA1 – Merrion Gates to Dún Laoghaire

CCA1 follows the coastline generally along the R118 Merrion Road/Rock Road, N31 and R119 Monkstown Road corridor, taking in the urban centres of the following suburbs of Dublin: Booterstown, Blackrock and Monkstown. The proposed Project at CCA1 is located entirely within Zone A: Dublin of the EPA Air Quality Index Region. The Air Quality Index indicates that the Air Quality for Zone A is 3 – Good.

The nearest active air quality monitoring location is in Sandymount, Dublin 4, located approximately 910m north of the Constraints Study Area. This monitoring site tracks PM concentrations, monitoring both PM_{10} and $PM_{2.5}$ hourly. Over the past six months, the mean PM_{10} concentration at this monitoring location has been 11.09µg/m^3 and mean $PM_{2.5}$ concentration has been 6.06µg/m^3, both below the CAFE Directive limit values. The 24-hour PM_{10} limit value has also not been exceeded within the last six months at this monitoring location.

Existing sources of pollution within the study area include:

- Railway traffic from existing rail line; and
- Local road traffic:
  - R118 Rock Road; and
  - N31 Frascati Road – Temple Road – Seapoint Avenue – Longford Terrace – Dún Laoghaire Road – Harbour Road.

Given the highly urbanised environment of CCA1, there are many constraints relative to air quality and climate. According to the Ordnance Survey Ireland (OSI) PRIME2 data (OSI, 2023), there are 2,493 residential properties, 15 commercial properties, and 30 community/recreational sites within CCA1.

Some specific constraints within CCA1 are as follows:

- South Dublin Bay SAC;
- South Dublin Bay and River Tolka SPA;
- South Dublin Bay pNHA;
- Sydney Parade DART/Train Station;
- Sandymount/Merrion Strand;
- St Vincent's University Hospital;
- Booterstown Nature Reserve/Booterstown Marsh;
- Booterstown DART/Train Station;
- Willow Park Junior School;
- Blackrock Park;
- Blackrock Private Hospital;
- Blackrock DART/Train Station;
- Seapoint DART/Train Station;
- Seapoint Beach/Park;
- Salthill and Monkstown DART/Train Station;
- De Vesci Gardens/Tennis Club; and
- West Pier of Dún Laoghaire Harbour.

The presence of three Protected European Sites in CCA1 is discussed in more detail in Section 2.1.3.1 (Biodiversity).

2.9.3.2 CCA2-3 – Dalkey Tunnel to Killiney South

CCA2-3 starts at Sorrento Point and follows the railway south along the coastline to the Shanganagh-Bray Wastewater Treatment Plant. Killiney, Ballybrack and Shankill are the suburbs of Dublin located in CCA 2-3. The proposed Project at CCA2-3 is located entirely within Zone A: Dublin of the EPA Air Quality Index Region. The Air Quality Index indicates that the Air Quality for Zone A is 3 – Good.

The nearest active air quality monitoring location is on Glenageary Road Lower, Dún Laoghaire, approximately 2.43km outside the northern end of the CCA2-3 Constraints Study Area. This monitoring site tracks Nitrogen dioxide and PM concentrations, monitoring both PM_{10} and $PM_{2.5}$ hourly. Over the past six months, the mean Nitrogen di-oxide concentration at this location has been 12.31 $\mu g/m^3$. The mean PM_{10} concentration at this monitoring location has been 12.32$\mu g/m^3$ and mean $PM_{2.5}$ concentration has been 7.78$\mu g/m^3$, both below the CAFE Directive limit values.

Existing sources of pollution within the study area include:

- Railway traffic from existing rail line; and
- Local road traffic:
  - R119 Sorrento Road – Vico Road – Victoria Road – Strathmore Road – Station Road – Seafield Road – Killiney Hill Road.

CCA2-3 is not as urban as CCA1 and therefore has less residential and commercial constraints. According to the OSI PRIME2 data (OSI, 2023), there are 1,629 residential properties, 0 commercial properties, and 2 community/recreational sites within CCA 2-3.

Some specific constraints within CCA2-3 are as follows:

- Dillon's Park;
- Sorrento Park/ Sorrento Point;
- Vico Bathing Place/Éire Sign #7;
- Dalkey Hill;
- Whiterock Beach;
- Killiney Hill Park;
- Killiney Strand;
- Killiney Beach;
- Killiney DART/Train Station;
- Martello Tower No.6;
- Killiney Beach Enoch Tower;
- Holy Child Secondary School;
- Hackettsland Bay Beach;
- Shanganagh Community Garden;
- Shanganagh Playground;
- Shankill GAA/Shanganagh Cliffs FC; and
- Shankill Beach.

2.9.3.3 CCA5 – Bray Head

CCA5 is situated between the towns of Bray and Greystones. Starting at the south-east extent of Bray, the CCA continues on the eastern side of Bray Head (between it and the Irish Sea) and travels south along the coastline to the northern extent of Greystones, ending at Greystones Marina Park. The proposed Project at CCA5 is located entirely within Zone C: Other Cities and Large Towns of the EPA Air Quality Index Region. The Air Quality Index indicates that the Air Quality for Zone C is 3 – Good.

The nearest active air quality monitoring location is at Greystones Fire Station, located approximately 380m outside the south of the Constraints Study Area. This monitoring site tracks PM concentrations, monitoring both PM10 and PM2.5 hourly. Over the past six months, the mean PM10 concentration at this monitoring location has been 10.5µg/m3 and mean PM2.5 concentration has been 7.2µg/m3, both below the CAFE Directive limit values. The 24-hour PM10 limit value has also not been exceeded within the last six months at this monitoring location.

Existing sources of pollution within the study area include:

- Railway traffic from existing rail line; and
- Local road traffic:
  - R766;
  - R766; and
  - R761.

CCA5 is predominantly rural, between the towns of Bray and Greystones. Therefore, it has few residential and commercial constraints. According to the OSI PRIME2 data (OSI, 2023), there are 742 residential properties, 4 commercial properties, and 1 community/recreational site within CCA5.

Some specific constraints within CCA5 are as follows:

- Bray Head SAC;
- Bray Head pNHA;
- Bray Head Cliff Walk/Bray Head Cross;
- Naylor's Cove;
- Raheen-A-Cluig (Medieval Church) (Tourist attraction);
- Gorse Hill Centre;
- North Beach Greystones;
- Greystones Dog Park/Greystones Marina Park/Greystones Marina Playground; and
- Rathdown Lower Bay Beach.

The presence of the Designated Site, Bray Head SAC is a major constraint at CCA5 as it extends from Bray Head to Templecarrig Stream in North Greystones, covering the full length of the proposed works at CCA5. This is discussed in more detail in Section 2.1.3.1 (Biodiversity).

2.9.3.4 CCA6.1 – Greystones to Newcastle

CCA6.1 is situated between the town of Greystones and the former Newcastle Train Station. Starting at the south-east extent of Greystones (at Marina Road, north of Greystones DART/Train Station), the CCA continues along the coastline following the train line to the former Newcastle Train Station. The proposed Project at CCA6.1 is located between Zone C: Other Cities and Large Towns and Zone D: Rural Ireland of the EPA Air Quality Index Region. The Air Quality Index indicates that the Air Quality for Zone C & D is 3 – Good.

The nearest active air quality monitoring location is Greystones Fire Station located within the Constraints Study Area at the northern end of CCA5. This is also the nearest active air quality monitoring location for CCA5 (see Section 2.9.3.3).

Existing sources of pollution within the study area include:

- Railway traffic from existing rail line;
- Local road traffic:
  - R761;
  - R762; and
  - R774.
- Newcastle Airfield.

Some specific constraints within CCA6.1 are as follows:

- The Murrough SPA;
- The Murrough Wetlands SAC;
- The Murrough pNHA;
- Greystones South Beach;
- Greystones DART/Train Station;
- Burnaby Road Park, including Greystones Chess Tables and Greystones Lawn Bowling Club;
- Burnaby Estate/Greystones Golf Club;

- Greystones Language School;
- Greystones Playground;
- South Beach Car Park/Greystones Park and Ride;
- Greystones United AFC;
- Greystones Golf Centre;
- Greystones South Beach;
- Cooldross Lower Bay Beach;
- Kilcoole Estuary;
- Leamore Lower Bay Beach/Leamore Strand;
- Six Mile Point;
- Bird Watch Ireland’s East Coast Nature Reserve;
- Newcastle Airfield/Newcastle Aerodrome; and
- Former Newcastle Train Station.

The presence of three protected European Sites is a major constraint at CCA6.1 as the Designated Sites extend from the south of Greystones to Newcastle Airfield, covering much of the proposed works area in CCA6.1. This is discussed in more detail in Section 2.1.3.1 (Biodiversity).

2.9.3.5 CCA6.2 – Newcastle to Wicklow Harbour

CCA6.2 is situated between the former Newcastle Train Station and the town of Wicklow. Starting at the former Newcastle Train Station, the CCA continues along the coastline following the train line before proceeding along Broad Lough and ending at Wicklow Harbour. The proposed Project at CCA6.2 is located within Zone D: Rural Ireland of the EPA Air Quality Index Region. The Air Quality Index indicates that the Air Quality for Zone D is 3 – Good.

The nearest active air quality monitoring location is Greystones Fire Station located approximately 6.56km to the north of CCA6.2. This is also the nearest active air quality monitoring location for CCA5 and CCA6.1 (see Section 2.9.3.3).

Existing sources of pollution within the study area include:

- Railway traffic from existing rail line;
- Newcastle Airfield; and
- Local road traffic:
  - R761;
  - R750; and
  - M11.

One Integrated Pollution Control (IPC) License for Industrial Emissions was granted within this CCA in December 2009 by Rampere Landfill.

Some specific constraints within CCA6.2 are as follows:

- The Murrough Wetlands SAC;
- The Murrough SPA;
- The Murrough pNHA;
- Cable Hut - Historic Workshop;
- Five Mile Point Bay Beach/Cottage at Five Mile Point;
- Clonmannan Stud/Clonmannon Farm;

- Major’s Cove;
- The Murrough Playground;
- Broad Lough;
- Wicklow Gaol;
- Black Castle; and
- Wicklow Harbour.

The presence of three Designated Sites is a major constraint at CCA6.2, as the Designated Sites extend the length of the proposed works at CCA6.2. This is discussed in more detail in Section 2.1.3.1 (Biodiversity).

2.10 Noise and Vibration

2.10.1 Introduction

Three of the five CCAs (i.e., CCA1, CCA2-3 and CCA5) are located in low density yet highly urbanised areas, where the main constraints relative to noise and vibration are likely to be those comprising part of the urban fabric (residential, commercial and community/recreational sites). CCA6.1 and CCA6.2 are situated in a more rural setting where urban fabric is not likely to be such a constraint as the other CCAs; however, CCA6.1 and CCA6.2 possess considerable amenity/recreational areas.

2.10.2 Methodology

The National Roads Project Management Guidelines (2000) (NRPMG) states:

'*The specific objective of the noise input to the Constraints Study is to identify any receptors that may be deemed to be particularly sensitive to noise and/or vibration. The Guidelines list examples as including schools, hospitals, places of worship, heritage buildings, special habitats, amenity areas in common use and designated quiet areas. However, residential properties must not be overlooked, and it may be noted that some commercial or industrial uses can also be noise sensitive, for example, recording studios and research or manufacturing facilities using noise or vibration-sensitive equipment*.'

2.10.2.1 Noise

A sensitive receptor in the context of noise and vibration relates to the following types of features:

- Dwelling or house;
- Hotel or hostel;
- Health building (providing patient services);
- Nursing/retirement home;
- Educational establishment;
- Place of worship or entertainment; and
- Locations where children are aged under six e.g., creches, or those with special needs.

2.10.2.2 Vibration

This relates to any location in which the inhabitants may be disturbed by vibrations:

- Protected structures;
- Residential day care centres; and
- Operating theatres.

2.10.3 Constraints per CCA

2.10.3.1 CCA1 – Merrion Gates to Dún Laoghaire

With reference to the Population and Human Health Chapter (Section 2.11), according to the Ordnance Survey Ireland (OSI) PRIME2 data (OSI, 2023), there are 2,493 residential properties, 15 commercial properties, and 30 community/recreational sites within CCA1(refer to Figure 2.1 - CCA1). Within this CCA some of the principal constraints are as follows:

- St Vincent's University Hospital;
- St Vincent's Private Hospital;

Willow Park Junior School;
Willow Park School;
St Mary's Boys National School;
St Oliver Plunket Special School;
Benincasa Special School;
Strand Montessori School;
Scoil Lorcáin School;
Blackrock Further Education Institute;
Blackrock Park;
Blackrock Private Hospital;
Blackrock Clinic Lab;
Merrion Gates Medical Centre;
St Patricks Church, Monkstown;
Monkstown Church of Ireland;
St John the Baptist Blackrock;
Our Lady Queen of Peace;
Blackrock DART/Train Station;
Seapoint DART/Train Station;
Several country Embassies to the north of the study area; and
Special habitats within the study area: Ramsar, SAC, SPA and pNHA.

2.10.3.1.1 Special Habitats

Special habitats within the study area are as follows:

Ramsar:

Sandymount Strand/Tolka Estuary Ramsar (832) (see biodiversity Figures 3.1 CCA1);

European Sites:

The South Dublin Bay SAC (Code 000210);
South Dublin Bay and River Tolka Estuary SPA (Code 004024);

Nationally designated sites, e.g., NHAs and pNHAs:

South Dublin Bay pNHA (Code 000210).

2.10.3.1.2 Heritage buildings

There are 453 RPSs within the CCA1 study area: (see Figure 6.1 CCA1)

2.10.3.1.3 Noise Contours

The following data sets from the EPA maps provides general information about the existing noise levels from both road and rail within the study area for day-evening-night noise (Lden). The noise levels at night will also be considered separately (Lnight), due to higher nuisance perception during quieter hours and to prevent sleep deprivation for nearby residents. These data sets are strategic noise mapping that represent the situation in 2021. The dB values that are portrayed for Lden on the following pictures and discussed in the text are the annual average decibel values over a 24-hour period. The dB values that are portrayed for Lnight are the annual average decibel values over the night-time, no exact time period is specified.

Picture 2-2: Noise Rail National – Lden (EPA Maps)

The strategic noise mapping of the national railway corridor (see Picture 2-2) presents noise contours for the Lden (day, evening, night). National railways have been identified by Transport Infrastructure Ireland (TII) and Irish Rail and are those that exceeded 30,000 passengers in 2021. The national rail noise levels are concentrated along the Dublin to Rosslare Europort rail line and are localised to this area. Noise levels along this rail line are in excess of 75dB.

Picture 2-3: Noise Rail National – Lnight (EPA Maps)

The strategic noise mapping of the national railway corridor (see Picture 2-3) presents noise contours for the Lnight (night). The national rail noise levels are concentrated along the Dublin Connolly to Rosslare Europort rail line and are localised to this area. Noise levels along this rail line for Lnight are lesser than those shown for Lden (see Picture 2-2) and do not exceed 70dB due to no rail traffic for this service between 11pm and 5:50am.

Picture 2-4: Noise Rail Agglomerations - Lden (EPA Maps)

The strategic noise mapping of the rail agglomerations corridor (see Picture 2-4) presents noise contours for the Lden (day, evening, night). Rail agglomerations includes all rail services including DART and local commuter services, as well as Luas light and heavy rail. The rail agglomerations noise levels are concentrated along the Howth/Malahide to Greystones DART line and are localised to this area. Noise levels along this rail line are in excess of 75dB.

Picture 2-5: Noise Rail Agglomerations - Lnight (EPA Maps)

The strategic noise mapping of the rail agglomerations corridor (see Picture 2-5) presents noise contours for the Lnight (night). The rail agglomerations noise levels are concentrated along the Howth/Malahide to Greystones DART line and are localised to this area. Noise levels along this rail line for Lnight are lesser than those shown for Lden (see Picture 2-4) and do not exceed 70dB due to no rail traffic for this service between approximately 12am and 5:00am.

Picture 2-6: Noise Road National – Lden (EPA Maps)

The strategic noise mapping of national roads (see Picture 2-6), presents noise contours for the Lden (day, evening, night) period. National roads were identified by Transport Infrastructure Ireland (TII) and local authorities and are those that exceeded 3 million passages in 2021. Noise levels are concentrated around the N31, N11 and R138, where they are shown to exceed 75dB.

Picture 2-7: Noise Road National - Lnight (EPA Maps)

The strategic noise mapping of national roads (see Picture 2-7) presents noise contours for the Lnight period. Noise levels are concentrated around the N31 and N11 where they are between 65-70dB, this is lesser than the noise impacts shown during Lden (Picture 2-6) due to reduced road traffic at night.

Picture 2-8: Noise Road Agglomerations – Lden (EPA Maps)

The strategic noise mapping of road agglomerations (see Picture 2-8) presents noise contours for the Lden (day, evening, night) period. Road agglomerations include all roads within the agglomeration areas. Noise levels are concentrated around the N31, N11 and R138, where they are shown to exceed 75dB.

Picture 2-9: Noise Road Agglomerations – Lnight (EPA Maps)

The strategic noise mapping of road agglomerations (see Picture 2-9) presents noise contours for the Lnight period. Noise levels remain concentrated around the N31 and N11 but are reduced in comparison to the noise impacts shown during Lden (Picture 2-7) due to reduced road traffic at night.

2.10.3.2 CCA2-3 – Dalkey Tunnel to Killiney South

CCA2-3 is also an urbanised environment, which starts at Sorrento Point and follows the railway south along the coastline to the Shanganagh-Bray Wastewater Treatment Plant (WwTP). Killiney, Ballybrack and Shankill are the suburbs of Dublin located in CCA 2-3. With reference to the Population and Human Health Chapter, see Section 2.11, according to the OSI PRIME2 data (OSI 2023), there are 1,629 residential properties, 0 commercial properties, and 2 community/recreational sites within CCA 2 (refer to Figure 2.1 – CCA2/3).

Within this CCA (from Sorrento Point to Shanganagh-Bray WwTP) are the following principal constraints (in addition to the above residential and commercial sites):

Dillon’s Park;
Sorrento Park/Sorrento Point;
Vico Bathing Place/Éire Sign #7;
Dalkey Hill;
Holy Child Secondary School;
Whiterock Beach;
Killiney Hill Park;
Killiney Strand;
Killiney Beach;
Killiney DART/Train Station;
Martello Tower No.6;
Killiney Beach Enoch Tower;
Holy Child Secondary School;
Hackettsland Bay Beach;
Shanganagh Community Garden;
Shanganagh Playground;
Shankill GAA/Shanganagh Cliffs FC; and
Shankill Beach.

2.10.3.2.1 Special Habitats

Special habitats within the study area are as follows (see biodiversity Figures 3.1 CCA2-3):European Sites:

Rockabill and Dalkey Island SAC (Code 003000) – the SAC surrounds Dalkey island and lies within the northern extent of the CCA2-3 study area;
Dalkey Island SPA (Code 004172);

Nationally designated sites e.g., NHAs and pNHAs:

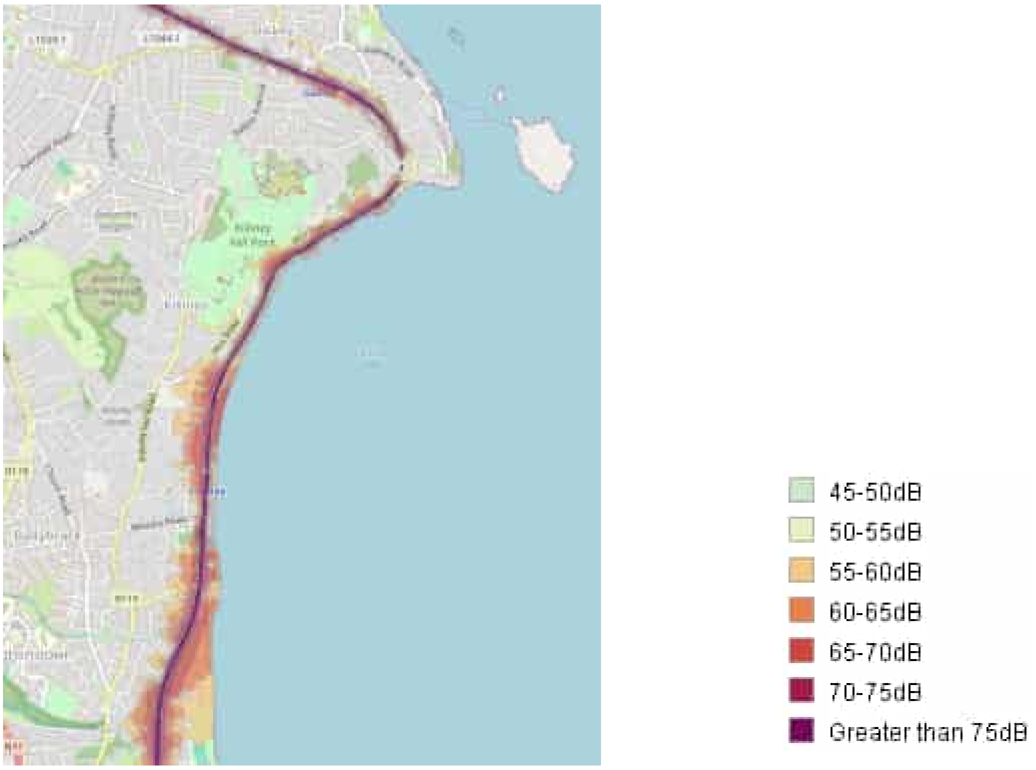
pNHA Dalkey Coastal Zone and Killiney Hill (Code 001206).

2.10.3.2.2 Record of Protected Structures (RPS)

There are 87 RPSs within the CCA2-3 study area (see Figure 6.1 CCA2-3).

2.10.3.2.3 Noise Contours

The following data sets from EPA maps provides general information about the existing noise levels from both road and rail within the study area for day-evening-night noise (Lden). The noise levels at night will need to be considered (Lnight), due to the higher nuisance perception during quieter hours and to prevent sleep deprivation.



Picture 2-10: Noise National Rail – Lden (EPA Maps)

The strategic noise mapping of the national railway corridor (see Picture 2-10) presents noise contours for the Lden (day, evening, night). National railways have been identified by Transport Infrastructure Ireland (TII) and Irish Rail and are those that exceeded 30,000 passengers in 2021. The national rail noise levels are concentrated along the Dublin to Rosslare Europort rail line and are localised to this area. Noise levels along this rail line are in excess of 75dB. This noise impact affects a greater area either side of the rail line as you move South past Killiney.

Picture 2-11: Noise National Rail – Lnight (EPA Maps)

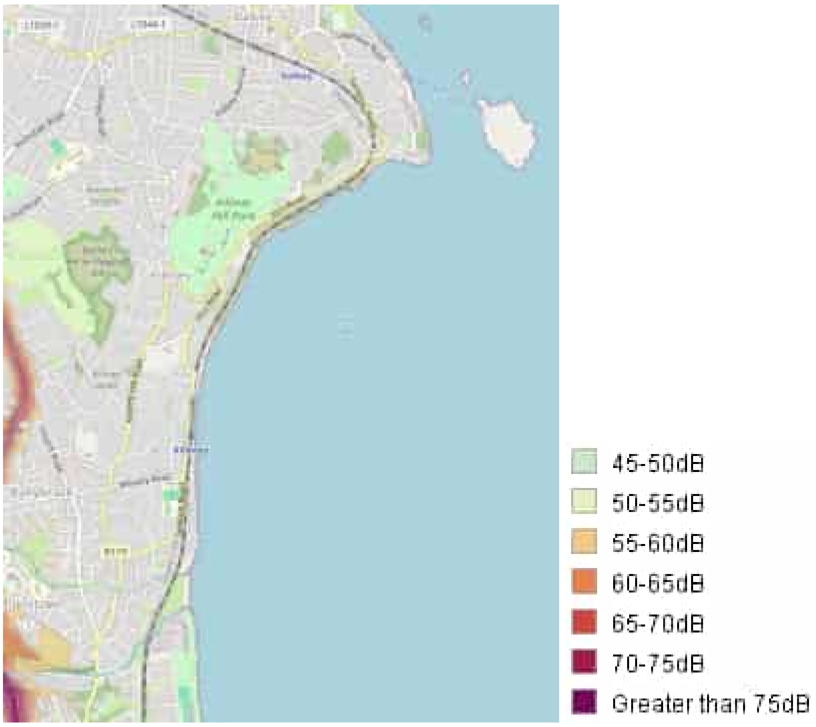
The strategic noise mapping of the national railway corridor (see Picture 2-11) presents noise contours for the Lnight (night). The national rail noise levels are concentrated along the Dublin Connolly to Rosslare Europort rail line and are localised to this area. Noise levels along this rail line for Lnight are lesser than those shown for Lden (see Picture 2-10) and do not exceed 70dB due to no rail traffic for this service between 11pm and 5:50am.

Picture 2-12: Noise Rail Agglomerations– Lden (EPA Maps)

The strategic noise mapping of the rail agglomerations corridor (see Picture 2-12) presents noise contours for the Lden (day, evening, night). Rail agglomerations includes all rail services including DART and local commuter services, as well as Luas light and heavy rail. The rail agglomerations noise levels are concentrated along the Howth/Malahide to Greystones DART line. Noise levels along this rail line are in excess of 75dB. Compared to CCA1, the rail noise affects a greater area around the rail line and is less localised.

Picture 2-13: Noise Rail Agglomerations– Lnight (EPA Maps)

The strategic noise mapping of the rail agglomerations corridor (see Picture 2-13) presents noise contours for the Lnight (night). The rail agglomerations noise levels are concentrated along the Howth/Malahide to Greystones DART line. Noise levels along this rail line for Lnight are lesser than those shown for Lden (see Picture 2-12) and do not exceed 70dB due to no rail traffic for this service between approximately 12am and 5:00am.

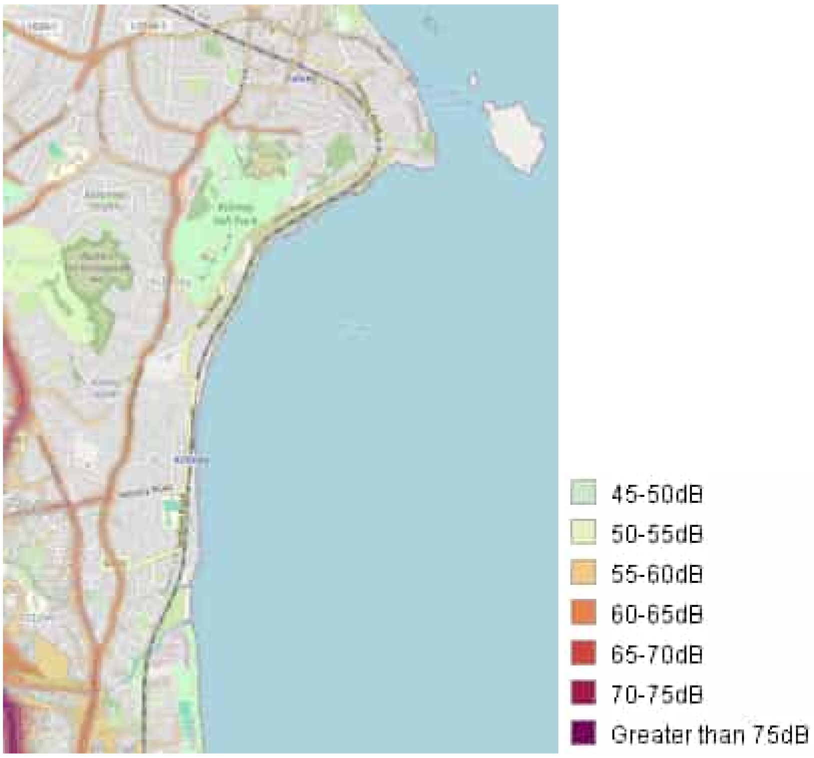


Picture 2-14: Noise National Road - Lden (EPA Maps)

The strategic noise mapping of national roads (see Picture 2-14), presents noise contours for the Lden (day, evening, night) period. National roads were identified by Transport Infrastructure Ireland (TII) and local authorities and are those that exceeded 3 million passages in 2021. There is no noise impact from national roads for this CCA due to their distance from the area, with the closest national roads being the N11 and L1062.

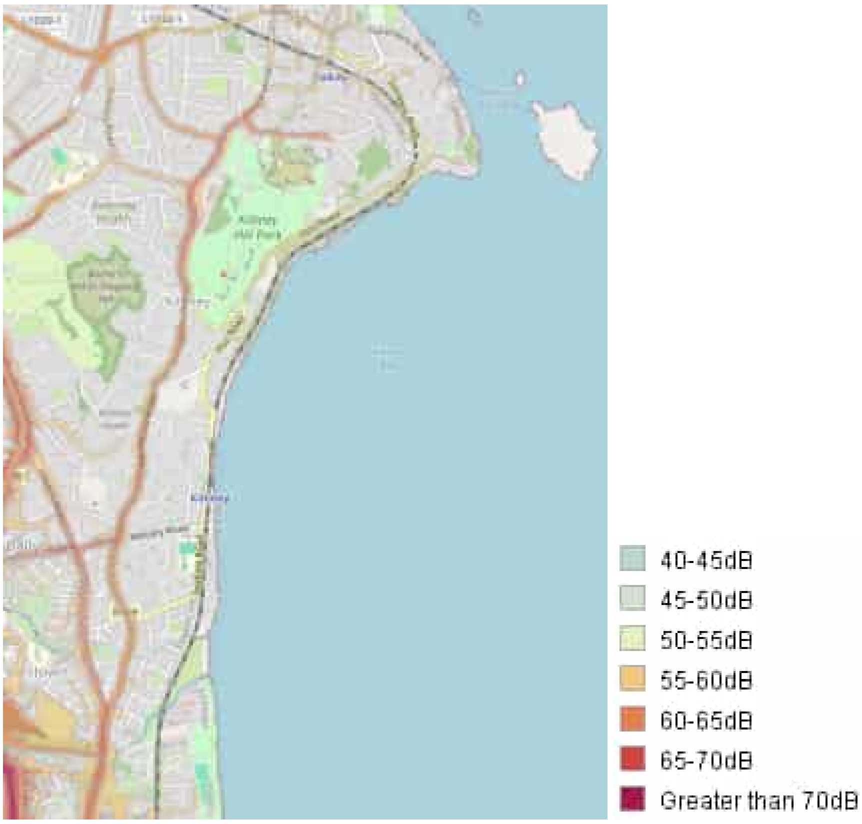
Picture 2-15: Noise National Road - Lnight (EPA Maps)

The strategic noise mapping of national roads (see Picture 2-15), presents noise contours for the Lnight (night) period. National roads were identified by Transport Infrastructure Ireland (TII) and local authorities and are those that exceeded 3 million passages in 2021. There is no noise impact from national roads for this CCA due to their distance from the area, with the closest national roads being the N11 and L1062.



Picture 2-16: Noise Road Agglomerations - Lden (EPA Maps)

The strategic noise mapping of roads agglomerations (see Picture 2-16) presents noise contours for the Lden (day, evening, night) period. Road agglomerations include all roads within the agglomeration areas. As can be seen the road noise levels are somewhat elevated in the vicinity of the main roads in the area such as the Killiney Hill Road.



Picture 2-17: Noise Road Agglomerations - Lnight (EPA Maps)

The strategic noise mapping of road agglomerations (see Picture 2-17) presents noise contours for the Lnight (night) period. As can be seen the road noise levels are somewhat elevated in the vicinity of the main roads in the area such as the Killiney Hill Road. Road noise levels are similar to that seen during the Lden period (see Picture 2-16).

2.10.3.3 CCA5 – Bray Head

According to the OSI PRIME2 data (OSI 2023), there are 742 residential properties, 4 commercial properties, and 1 community/recreational site within CCA5 (refer to Figure 2.1 – CCA5). Within this CCA the following are some of the key constraints (in addition to the above residential and commercial sites):

Bray Head Cliff Walk/Bray Head Cross;
Naylor’s Cove;
Raheen-A-Cluig (Medieval Church);
Shelter/Viewpoint;
Lord Meath’s Lodge;
Emergency Call Booth/AED Defibrillator;

Éire Sign #8;
Gorse Hill Centre;
North Beach Greystones;
AED Public Access Defibrillator;
St Crispin’s Cell;
Greystones Dog Park/Greystones Marina Park/Greystones Marina Playground; and
Rathdown Lower Bay Beach.

2.10.3.3.1 Special Habitats

Special habitats within the study area are as follows (see Biodiversity Figures 3.1 CCA5):

European Sites:

Bray Head SAC (Code 000714);

Nationally designated sites e.g., NHAs and pNHAs:

South Dublin Bay pNHA (Code 000210).

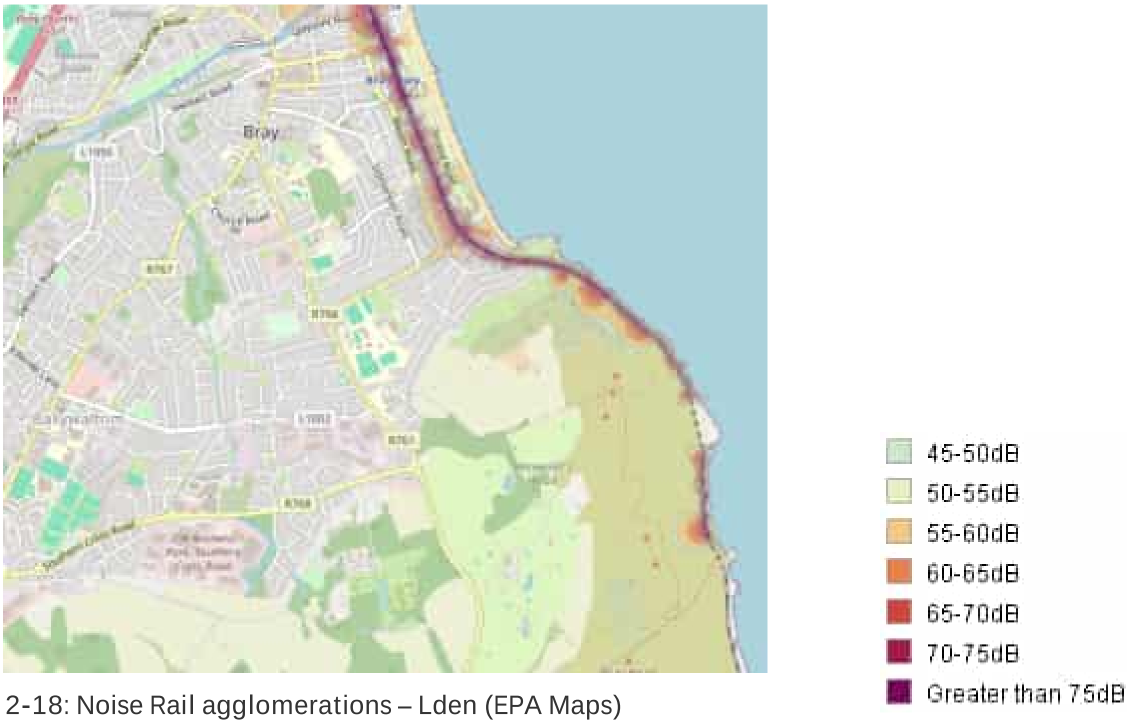
2.10.3.3.2 Record of Protected Structures (RPS)

There are 10 RPSs within the CCA5 study area (see Constraints Report Figure 6.1 CCA5).

2.10.3.3.3 Noise Contours

The following data sets from EPA maps provides general information about the existing noise levels from both road and rail within the study area for day-evening-night noise (Lden). The noise levels at night will need to be considered (Lnight), due to the higher nuisance perception during quieter hours and to prevent sleep deprivation for nearby residents.

There is no data on the EPA Maps for National Rail Lden or Lnight within CCA5 so there are no images to display. There is only partial data on the EPA Maps for Rail and Road agglomerations, covering only from the Northern end of the CCA to approximately Kilmacanoge. For this reason, only a section of the CCA is depicted on Picture 2-18, Picture 2-19, Picture 2-22 and Picture 2-23.

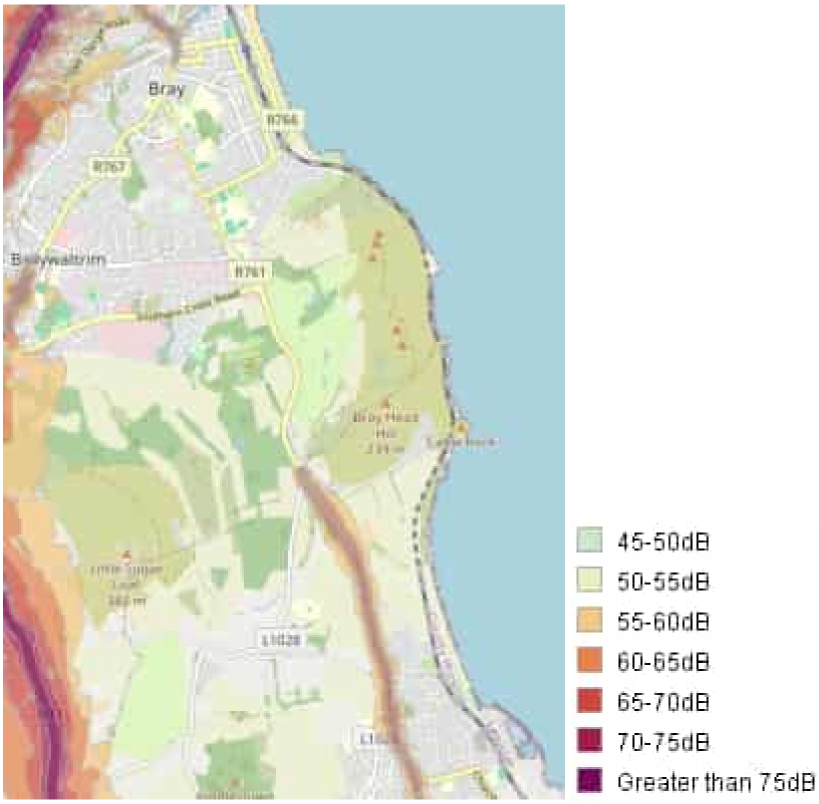


Picture 2-18: Noise Rail agglomerations – Lden (EPA Maps)

The strategic noise mapping of the rail agglomerations corridor (see Picture 2-18) presents noise contours for the Lden (day, evening, night). Rail agglomerations includes all rail services including DART and local commuter services, as well as Luas light and heavy rail. The rail agglomerations noise levels are concentrated and localised along the Howth/Malahide to Greystones DART line. Noise levels along this rail line are in excess of 75dB.

Picture 2-19: Noise Rail Agglomerations– Lnight (EPA Maps)

The strategic noise mapping of the rail agglomerations corridor (see Picture 2-19) presents noise contours for the Lnight (night) period. The rail agglomerations noise levels are concentrated along the Howth/Malahide to Greystones DART line. Noise levels along this rail line for Lnight are lesser than those shown for Lden (see Picture 2-18) and do not exceed 70dB due to no rail traffic for this service between approximately 12am and 5:00am.



Picture 2-20: Noise National Road - Lden (EPA Maps)

The strategic noise mapping of national roads (see Picture 2-20) presents noise contours for the Lden (day, evening, night) period. National roads were identified by Transport Infrastructure Ireland (TII) and local authorities and are those that exceeded 3 million passages in 2021. The R761 is the closest national road to the CCA and has noise levels of 70-75dB, further way is the N11 with noise impacts greater than 75dB.

Picture 2-21: Noise National Road - Lnight (EPA Maps)

The strategic noise mapping of national roads (see Picture 2-21) presents noise contours for the Lnight (night) period. National roads were identified by Transport Infrastructure Ireland (TII) and local authorities and are those that exceeded 3 million passages in 2021. At night the noise levels along the R761 and N11 decrease to between 55-60dB and 65-70dB respectively, due to reduced road traffic.

Picture 2-22: Noise Road Agglomerations - Lden (EPA Maps)

The strategic noise mapping of roads agglomerations (see Picture 2-22) presents noise contours for the Lden (day, evening, night) period. Road agglomerations include all roads within the agglomeration areas. Noise levels are elevated around the R roads in the area (including R761, R766, R767 etc), with noise levels between 65-75dB.

Picture 2-23: Noise Road Agglomerations - Lnight (EPA Maps)

The strategic noise mapping of road agglomerations (see Picture 2-23) presents noise contours for the Lnight (night) period. Noise levels are elevated around the R roads in the area (including R761, R766, R767 etc), with noise levels between 60-70dB. This is lower than noise levels shown during the Lden period (see Picture 2-22).

2.10.3.4 CCA6.1 – Greystones to Newcastle

According to the OSI PRIME2 data (OSI, 2023), there are 8,114 residential properties, 38 commercial properties, and 36 community/recreational sites within CCA6.1 (refer to Figure 2.1 – CCA6.1).

Within this CCA are the following constraints (in addition to the above residential and commercial sites):

- Carrig Clinic;
- St David’s Holy Faith Secondary School.
- Greystones South Beach;
- Greystones DART/Train Station;
- Burnaby Road Park, including Greystones Chess Tables and Greystones Lawn Bowling Club;
- Burnaby Estate/Greystones Golf Club;
- Greystones Language School;
- Greystones Playground;
- South Beach Car Park/Greystones Park and Ride;
- Greystones United AFC;
- Greystones Golf Centre;
- Greystones South Beach;
- Cooldross Lower Bay Beach;
- Kilcoole Estuary;
- Leamore Lower Bay Beach/Leamore Strand;

Six Mile Point;
St Patricks Church;
Bird Watch Ireland's East Coast Nature Reserve;
Newcastle Airfield/Newcastle Aerodrome; and
Former Newcastle Train Station.

Table 2-22: Potential Sensitive Receptors in CCA6.1

Receptor Type	Area	Number
Religious and Place of Worship	CCA6.1	8
Hospital	CCA6.1	-
Education and Enterprise	CCA6.1	12
Community Sports and Youth Centre	CCA6.1	4

2.10.3.4.1 Special Habitats

Special habitats within the study area are as follows (see Biodiversity Figures 3.1 CCA6.1):

European Sites:

The Murrough Wetland SAC (Code 002249);
The Murrough SPA (Code 004186);

Nationally designated sites, e.g., NHAs and pNHAs:

The Murrough pNHA (Code 000730).

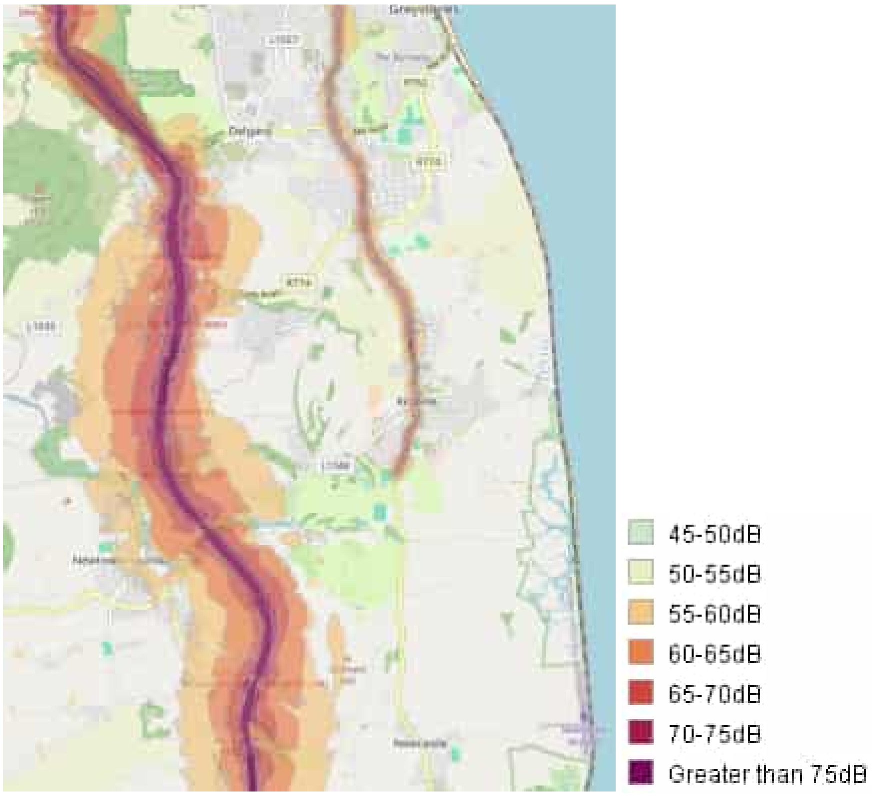
2.10.3.4.2 Record of Protected Structures (RPS)

There are no RPSs within the CCA6.1 study area (see Constraints Report Figure 6.1 CCA 6.1).

2.10.3.4.3 Noise Contours

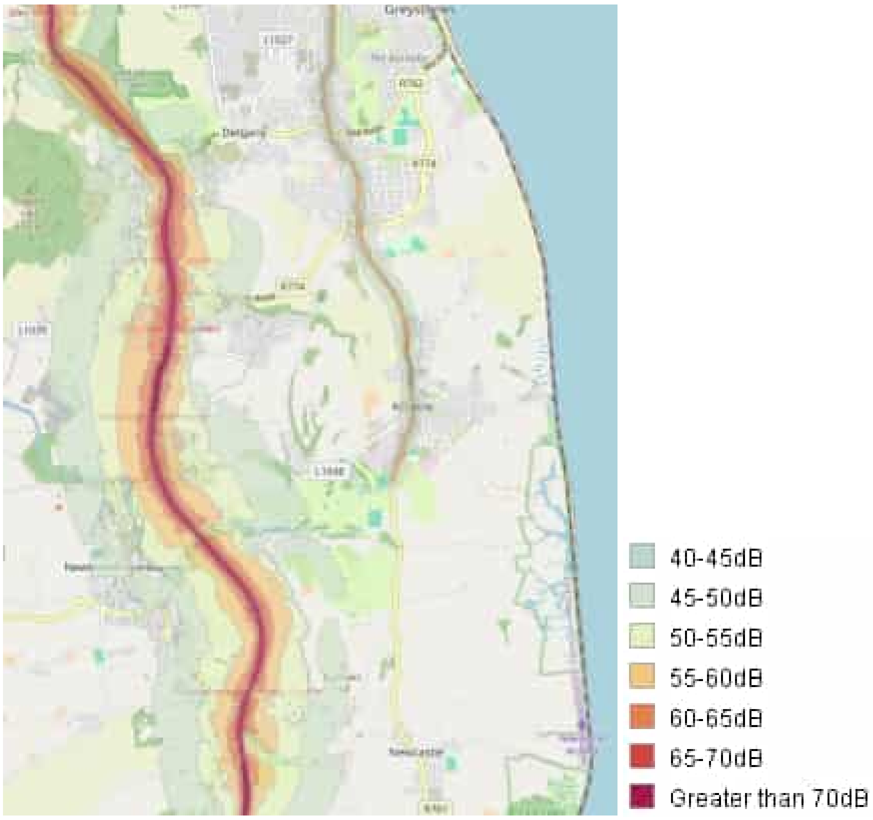
The following data sets from EPA maps provides general information about the existing noise levels from road sources only as there is no data for rail sources in this area. The data covers day-evening-night noise (Lden) and the noise levels at night will need to be considered (Lnight), due to the higher nuisance perception during quieter hours and to prevent sleep deprivation for nearby residents.

There is no data on the EPA Maps for National Rail, Rail agglomerations or Road agglomerations for Lden or Lnight within CCA6.1.



Picture 2-24: Noise National Road - Lden (EPA Maps)

The strategic noise mapping of national roads (see Picture 2-24), presents noise contours for the Lden (day, evening, night) period. National roads were identified by Transport Infrastructure Ireland (TII) and local authorities and are those that exceeded 3 million passages in 2021. As can be seen the road noise levels are elevated in the vicinity of the main roads in the area, specifically close to the N11/M11 and R761 roads, with noise levels between 70-75dB and 70-75dB respectively.



Picture 2-25: Noise National Road – Lnight (EPA Maps)

The strategic noise mapping of roads (see Picture 2-25) presents noise contours for the Lnight (night) period. As can be seen the road noise levels are elevated in the vicinity of the main roads in the area, specifically close to the N11/M11 and R761 roads, with noise levels between 65-70dB and 55-60dB respectively. These noise levels are lower than during the Lden (see Picture 2-24) period due to reduced road traffic over night.

2.10.3.5 CCA6.2 – Newcastle to Wicklow Harbour

According to the OSI PRIME2 data (OSI, 2023), there are 5,918 residential properties, 49 commercial properties, and 40 community/recreational sites within CCA6.2 (refer to Figure 2.1 – CCA6.2).

Within this CCA are the following constraints (in addition to the above residential and commercial sites):

Cable Hut – Historic Workshop;
Clonmannan Stud/Clonmannon Farm;
The Murrough Playground;
Black Castle;
Wicklow Primary Healthcare Centre;
Rathnew Play ground;
St Jospen’s Church;
St Ceon’s National School;
East Glendalough School;
Wicklow Church of Ireland;
Educate Together Secondary School; and
Glebe National School.

Table 2-23: Potential Sensitive Receptors in CCA6.2

Receptor Type	Area	Number
Religious and Place of Worship	CCA6.2	5
Hospital	CCA6.2	-
Education and Enterprise	CCA6.2	20
Community Sports and Youth Centre	CCA6.2	5

2.10.3.5.1 Special Habitats

Special habitats within the study area are as follows (see Biodiversity Figures 6.2 CCA1):

European Sites:

The Murrough Wetland SAC (Code 002249);
The Murrough SPA (Code 004186);

Nationally designated sites e.g., NHAs and pNHAs:

The Murrough pNHA (Code 000730).

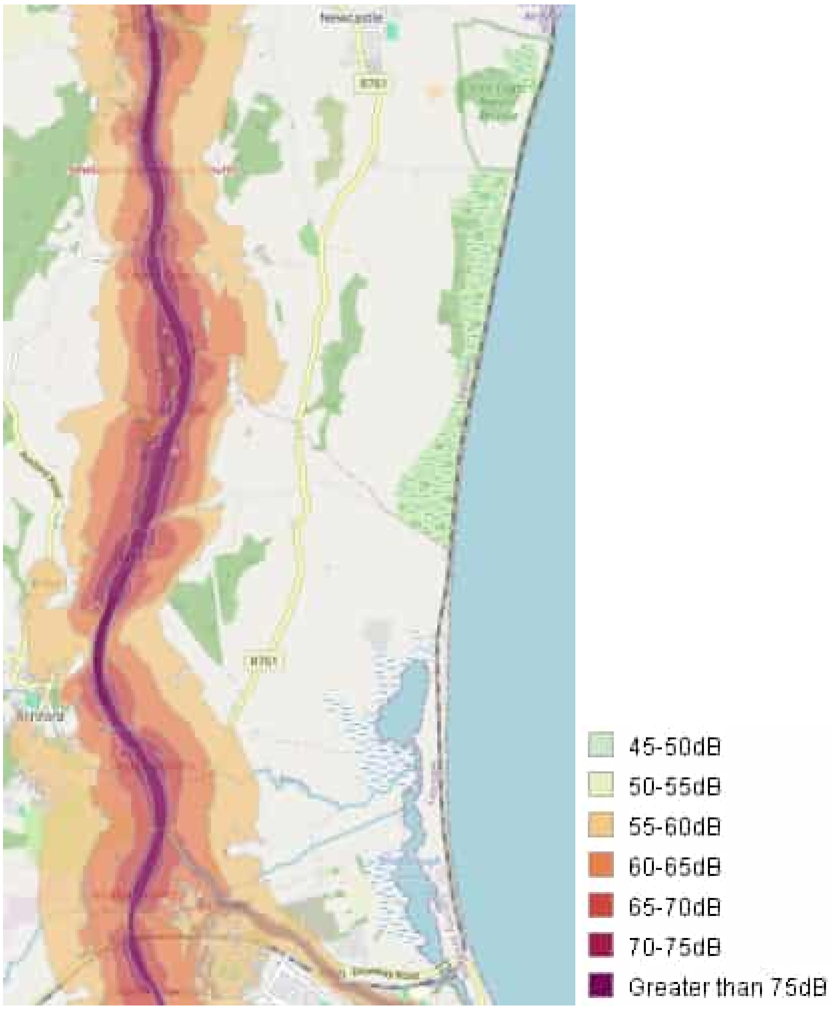
2.10.3.5.2 Record of Protected Structures (RPS)

There are no RPSs within the CCA6.2 study area (see Constraints Report Figure 6.1 CCA 6.2).

2.10.3.5.3 Noise Contours

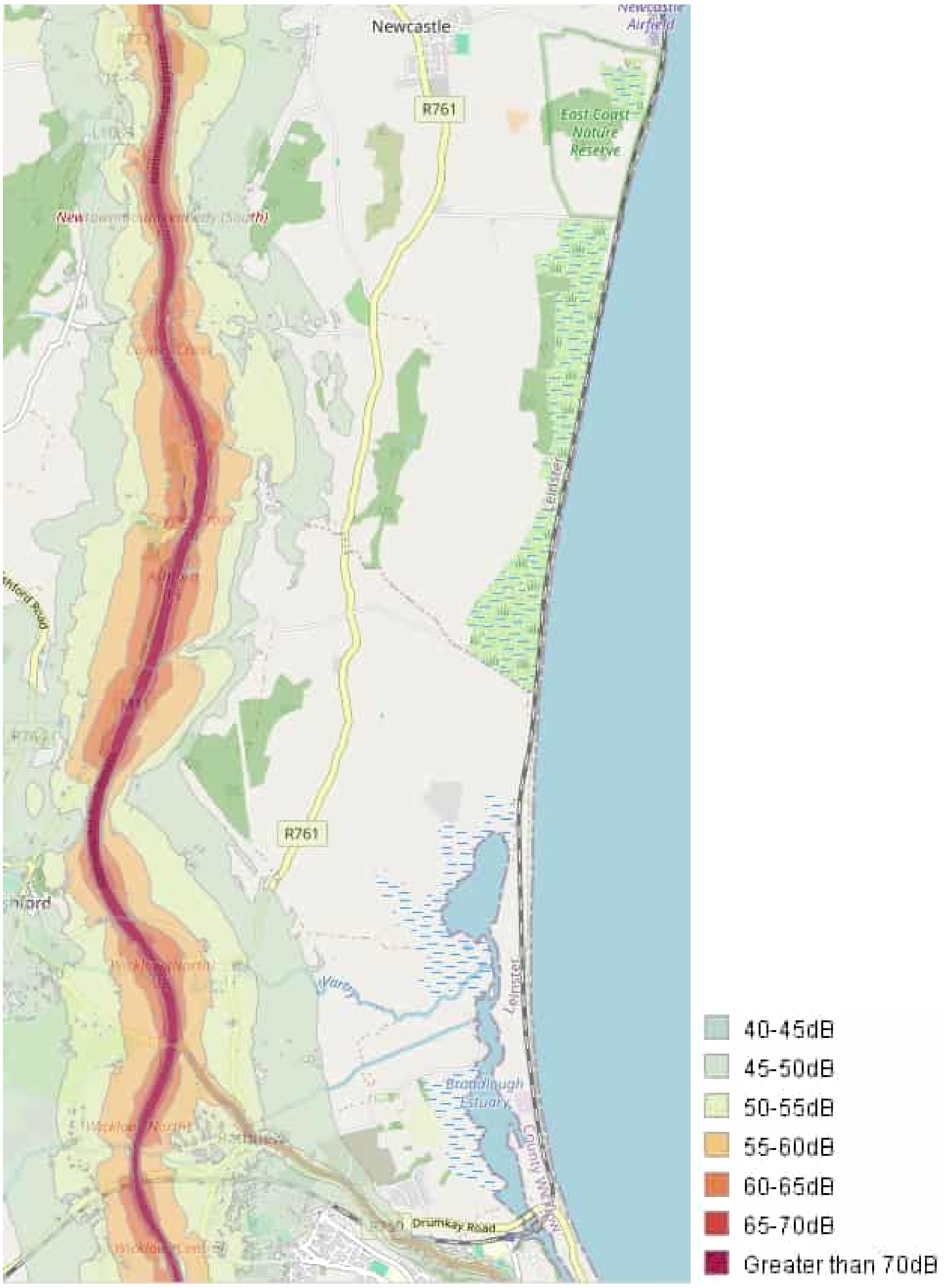
The following data sets from EPA maps provides general information about the existing noise levels from both road sources only as there is no data for rail sources in this area. The data and rial rail within the study area forcovers day-evening-night noise (Lden) and the noise levels at night which will need to be considered (Lnight), due to the higher nuisance perception during quieter hours and to prevent sleep deprivation for nearby residents.

There is no data on the EPA Maps for National Rail, Rail agglomerations or Road agglomerations for Lden or Lnight within CCA6.2.



Picture 2-26: Noise National Road - Lden (EPA Maps)

The strategic noise mapping of national roads (see Picture 2-26) presents noise contours for the Lden (day, evening, night) period. National roads were identified by Transport Infrastructure Ireland (TII) and local authorities and are those that exceeded 3 million passages in 2021. As can be seen the road noise levels are elevated in the vicinity of the main roads in the area, specifically close to the N11/M11 roadway with noise levels greater than 75dB.



Picture 2-27: Noise National Road – Lnight (EPA Maps)

The strategic noise mapping of roads (see Picture 2-27) presents noise contours for the Lnight (night) period. As can be seen the road noise levels are elevated in the vicinity of the main roads in the area, specifically close to the N11/M11 roadway with noise levels greater than 70dB. These noise levels are reduced during the Lnight period when compared to the Lday period (see Picture 2-26) due to reduced road traffic levels.

2.11 Population and Human Health

2.11.1 Introduction

This section of the report outlines the constraints of the Projects relative to population and human health. Population refers to the way in which people live, work, relate to one another, organise to meet their needs and generally operate as members of society. The World Health Organization (WHO) Constitution, which came into force in 1948, defines health as ‘*a state of complete physical, mental and social well-being and not merely the absence or infirmity*’ (WHO, 1948). Section 2.11.2 outlines the methodological approach undertaken to take account of relevant constraints of the Projects as well as the identification of such constraints relative to each of the Projects’ CCAs.

2.11.2 Methodology

There is no prescribed method within any legislation, policy or guidelines for determining constraints of the Projects relative to population and/or human health. As such, this constraints study is desk-based, informed by publicly available information sources and executed using professional judgement. It is within this context that this constraints study has been carried out, having cognisance of the following published guidelines and documents:

- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EIARs) (EPA 2022);
- Advise Notes on Current Practice in the Preparation of an EIS (EPA 2003);
- Environmental Impact Assessment of Projects. Guidance on the Preparation of the Environmental Impact Assessment Reports (EIARs) (European Commission 2017);
- Human Health: Ensuring a High Level of Protection. A reference paper on addressing Human Health in Environmental Impact Assessment (hereafter referred to as the IAIA and EUPHA Guidance) (International Association for Impact Assessment (IAIA) and European Public Health Association (EUPHA), 2020);
- Institute of Public Health Ireland (IPH) Health Impact Assessment Guidance: A Manual (IPH 2021); and
- Determining Significance for Human Health in Environmental Impact Assessment (Pyper *et al.* 2022 on behalf of IEMA).

In particular respect to human health, the European Commission’s Guidance on the Preparation of the EIARs (European Commission 2017) notes that ‘*human health is a very broad factor*’ that is ‘*highly project dependent*’. It states that:

> ‘*The notion of human health should be considered in the context of other factors in Article 3(1) of the EIA Directive and thus environmentally related health issues (such as health effects caused by the release of toxic substances to the environment, health risks arising from major hazards associated with the Project, effects caused by changes in disease vectors caused by the Project, changes in living conditions, effects on vulnerable groups, exposure to traffic noise or air pollutants) are obvious aspects to study.*’

As such and given often transferrable nature of constraints of the Projects relative to human health (i.e., constraints relevant to human health are typically also relevant to other environmental topics and therefore covered in other sections of this report), the Projects constraints outlined below are identified for the assessment topic of “population and human health” collectively rather than identified separately.

2.11.3 Constraints per CCA

As mentioned in Section 1.2, there are five CCAs considered in this constraints study. All of these CCAs are located on the eastern coast of Ireland, within counties Dublin and Wicklow. These counties have a population of 1,458,154 and 155,184, respectively, according to the 2022 Census (CSO 2023). Three of the five CCAs (i.e., CCA1, CCA2-3 and CCA5) are located in low density yet highly urbanised areas where the main constraints relative to population and human health are likely to be those comprising part of the urban fabric (residential, commercial and community/recreational sites). CCA6.1 and CCA6.2 are situated in a more rural setting where urban fabric is not likely to be such a constraint as the other CCAs; however, CCA6.1 and CCA6.2 possess considerable amenity/recreational areas.

2.11.3.1 CCA1 – Merrion Gates to Dún Laoghaire

Given the highly urbanised environment of CCA1, there are many constraints relative to population and human health. The CCA follows the coastline generally along the R118 Merrion Road/Rock Road, N31 and R119 Monkstown Road corridor, taking in the urban centres of the following suburbs of Dublin: Booterstown, Blackrock and Monkstown. According to the Ordnance Survey Ireland (OSI) PRIME2 data (OSI 2023), there are 2,493 residential properties, 15 commercial properties, and 30 community/recreational sites within CCA1. Table 2-24 presents the 2016 population[3] of the EDs[4] in which CCA1 is located.

Table 2-24: Population of Electoral Divisions (EDs) within CCA1 (CSO 2016)

Electoral Division	Population (2016)
Pembroke East C (Dublin)	3,920
Pembroke East D (Dublin)	5,263
Blackrock-Booterstown (Dublin)	3,436
Blackrock-Williamstown (Dublin)	2,982
Blackrock-Central (Dublin)	3,733
Blackrock-Templehill (Dublin)	2,658
Blackrock-Seapoint (Dublin)	1,450
Blackrock-Monkstown (Dublin)	3,239
Dún Laoghaire-Salthill (Dublin)	1,789
Total:	**28,470**

Within this CCA, are the following constraints (in addition to the above residential and commercial sites):

- Sydney Parade DART/Train Station;
- Sandymount/Merrion Strand;
- St Vincent's University Hospital;
- Booterstown Nature Reserve/Booterstown Marsh;
- Booterstown DART/Train Station;

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[3] Equivalent statistics for the 2022 Census had not yet been published at the time of writing.

[4] Electoral Divisions (EDs) are the smallest legally defined administrative areas in Ireland, and a geographical spatial area in which census or other population-related statistics are provided by the Central Statistics Office (CSO).

- Willow Park Junior School;
- Blackrock Park; and
- Blackrock Private Hospital.
- St Vincent’s University Hospital;
- St Vincent’s Private Hospital;
- Willow Park Junior School;
- Willow Park School;
- St Mary’s Boys National School;
- St Oliver Plunket Special School;
- Benincasa Special School;
- Strand Montessori School;
- Scoil Lorcáin School;
- Blackrock Further Education Institute;
- Blackrock Park;
- Blackrock Private Hospital;
- Blackrock Clinic Lab;
- Merrion Gates Medical Centre;
- St Patricks Church, Monkstown;
- Monkstown Church of Ireland;
- St John the Baptist Blackrock;
- Our Lady Queen of Peace; and
- Several country Embassies to the north of the study area.
- Blackrock DART/Train Station;
- Seapoint DART/Train Station;
- Seapoint Beach/Park;
- Salthill and Monkstown DART/Train Station;
- De Vesci Gardens/Tennis Club; and
- West Pier of Dún Laoghaire Harbour.

In the southern half of this CCA (from the N31/R118 junction near Frascati Shopping Centre to the area around the West Pier of Dún Laoghaire Harbour), there are the following constraints (in addition to the above residential and commercial sites):

- Blackrock DART/Train Station;
- Seapoint DART/Train Station;
- Seapoint Beach/Park;
- Salthill and Monkstown DART/Train Station;
- De Vesci Gardens/Tennis Club; and
- West Pier of Dún Laoghaire Harbour.

2.11.3.2 CCA2-3 – Dalkey Tunnel to Killiney South

CCA2-3 is an urbanised environment, starting at Sorrento Point and following the railway south along the coastline to the Shanganagh-Bray Wastewater Treatment Plant. Killiney, Ballybrack and Shankill are the suburbs of Dublin located in CCA 2-3. According to the OSI PRIME2 data (OSI, 2023), there are 1,629 residential properties, 0 commercial properties, and 2 community/recreational sites within CCA 2-3. Table 2-25 presents the 2016 population[5] of the EDs[6] in which CCA2-3 is located.

Table 2-25: Population of Electoral Divisions (EDs) within CCA2-3 (CSO 2016)

Electoral Division	Population (2016)
Dalkey-Coliemore (Dublin)	1,341
Dalkey Hill (Dublin)	1,617
Killiney North (Dublin)	3,330
Killiney South (Dublin)	6,386
Shankill-Rathsallagh (Dublin)	3,268
Total:	**15,942**

Within this CCA (from Sorrento Point to Shanganagh-Bray WwTP), are the following constraints (in addition to the above residential and commercial sites):

- Dillon's Park;
- Sorrento Park/Sorrento Point;
- Vico Bathing Place/Éire Sign #7;
- Dalkey Hill;
- Holy Child Secondary School;
- Whiterock Beach;
- Killiney Hill Park;
- Killiney Strand;
- Killiney Beach;
- Killiney DART/Train Station;
- Martello Tower No.6;
- Killiney Beach Enoch Tower;
- Holy Child Secondary School;
- Hackettsland Bay Beach;
- Shanganagh Community Garden;
- Shanganagh Playground;
- Shankill GAA/Shanganagh Cliffs FC; and
- Shankill Beach.

2.11.3.3 CCA5 – Bray Head

CCA5 is situated between the towns of Bray and Greystones. Starting at the south-east extent of Bray, the CCA continues on the eastern side of Bray Head (between it and the Irish Sea) and travels south along the coastline to the northern extent of Greystones, ending at Greystones Marina Park. Bray and Greystones are the only urban centres of relevance to CCA5. According to the OSI PRIME2 data (OSI, 2023), there are 742 residential properties,

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[5] Equivalent statistics for the 2022 Census had not yet been published at the time of writing.

[6] Electoral Divisions (EDs) are the smallest legally defined administrative areas in Ireland, and a geographical spatial area in which census or other population-related statistics are provided by the Central Statistics Office (CSO).

4 commercial properties, and 1 community/recreational sites within CCA5. Table 2-26 presents the 2016 population[7] of the EDs[8] in which CCA5 is located.

Table 2-26: Population of Electoral Divisions (EDs) within CCA5 (CSO 2016)

Electoral Division	Population (2016)
Bray No.2 (Wicklow)	6,414
Kilmacanoge (Wicklow)	14,706
Delgany (Wicklow)	5,980
Greystones (Wicklow)	7,258
Total:	**34,358**

Within this CCA are the following constraints (in addition to the above residential and commercial sites):

- Bray Head Cliff Walk/Bray Head Cross;
- Naylor’s Cove;
- Raheen-A-Cluig (Medieval Church);
- Shelter/Viewpoint;
- Lord Meath’s Lodge;
- Emergency Call Booth/AED Defibrillator;
- Éire Sign #8;
- Gorse Hill Centre;
- North Beach Greystones;
- AED Public Access Defibrillator;
- St Crispins Cell;
- Greystones Dog Park/Greystones Marina Park/Greystones Marina Playground; and
- Rathdown Lower Bay Beach.

2.11.3.4 CCA6.1 – Greystones to Newcastle

CCA6.1 is situated between the town of Greystones and the former Newcastle Train Station. Starting at the south-east extent of Greystones (at Marina Road, north of Greystones DART/Train Station), the CCA continues along the coastline following the train line to the former Newcastle Train Station. Greystones is the only urban centre of relevance to CCA6.1. According to the OSI PRIME2 data (OSI, 2023), there are 8,114 residential properties, 38 commercial properties, and 36 community/recreational sites within CCA6.1. Table 2-27 presents the 2016 population[9] of the EDs[10] in which CCA6.1 is located.

Table 2-27: Population of Electoral Divisions (EDs) within CCA6.1 (CSO 2016)

Electoral Division	Population (2016)
Greystones (Wicklow)	7,258

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[7] Equivalent statistics for the 2022 Census had not yet been published at the time of writing.

[8] Electoral Divisions (EDs) are the smallest legally defined administrative areas in Ireland, and a geographical spatial area in which census or other population-related statistics are provided by the Central Statistics Office (CSO).

[9] Equivalent statistics for the 2022 Census had not yet been published at the time of writing.

[10] Equivalent statistics for the 2022 Census had not yet been published at the time of writing.

Kilcoole (Wicklow)	10,731
Newcastle Lower (Wicklow)	2,354
Total:	**20,343**

Within this CCA are the following constraints (in addition to the above residential and commercial sites):

- The Beach Bear Greystones (statue);
- Greystones South Beach;
- Greystones DART/Train Station;
- Burnaby Road Park, including Greystones Chess Tables and Greystones Lawn Bowling Club;
- Burnaby Estate/Greystones Golf Club;
- Greystones Language School;
- Greystones Playground;
- South Beach Car Park/Greystones Park and Ride;
- Greystones United AFC;
- Greystones Golf Centre;
- Greystones South Beach;
- Cooldross Lower Bay Beach;
- Kilcoole Estuary;
- Leamore Lower Bay Beach/Leamore Strand;
- Six Mile Point;
- Bird Watch Ireland's East Coast Nature Reserve;
- Newcastle Airfield/Newcastle Aerodrome; and
- Former Newcastle Train Station.

2.11.3.5 CCA6.2 – Newcastle to Wicklow Harbour

CCA6.2 is situated between the former Newcastle Train Station and the town of Wicklow. Starting at the former Newcastle Train Station, the CCA continues along the coastline following the train line before proceeding along Broad Lough and ending at Wicklow Harbour. Rathnew and Wicklow are the urban centres of relevance to CCA6.2. According to the OSI PRIME2 data (OSI, 2023), there are 5,918 residential properties, 49 commercial properties, and 40 community/recreational sites within CCA6.2. Table 2-28 presents the 2016 population[11] of the EDs[12] in which CCA5 is located.

Table 2-28: Population of Electoral Divisions (EDs) within CCA6.2 (CSO 2016)

Electoral Division	Population (2016)
Newcastle Lower (Wicklow)	2,354
Wicklow Rural (Wicklow)	8,163
Wicklow Urban (Wicklow)	6,762
Total:	**17,279**

Within this CCA are the following constraints (in addition to the above residential and commercial sites):

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[11] Equivalent statistics for the 2022 Census had not yet been published at the time of writing.

[12] Electoral Divisions (EDs) are the smallest legally defined administrative areas in Ireland, and a geographical spatial area in which census or other population-related statistics are provided by the Central Statistics Office (CSO).

Cable Hut – Historic Workshop;
Clonmannan Stud/Clonmannon Farm;
The Murrough Playground;
Black Castle;
Wicklow Primary Healthcare Centre;
Rathnew Play ground;
St Jospen’s Church;
St Ceon’s National School;
East Glendalough School;
Wicklow Church of Ireland;
Educate Together Secondary School; and
Glebe National School.

2.12 Traffic and Transport

2.12.1 Introduction

As the ECRIPP programme is targeted at defending the coastal railway line from erosion and flooding, the location of the rail line itself and associated infrastructure are key considerations for this study. There is also a need to preserve existing travel by road, public transport, and active modes. This section provides an overview of the Traffic and Transport constraints relevant to the project.

2.12.2 Methodology

Traffic and Transport constraints have been identified based on a desktop study. This constraints study takes into account:

- Policy context;
- Existing and planned transport infrastructure; and
- Challenges facing traffic and transport (including both passenger travel and freight movement).

In terms of policy context, the National Transport Authority's (NTA's) Transport Strategy sets out the framework for investment in transport infrastructure and services up to 2042. The Transport Strategy outlines its overall aim as follows:

'*To provide a sustainable, accessible and effective transport system for the GDA which meets the region's climate change requirements, serves the needs of urban and rural communities, and supports the regional economy.*'

The Transport Strategy outlines the need for maintaining existing transport infrastructure, as well as the importance of building resilience to disruptions that may occur. The following measures from the Transport Strategy outlined in Table 2-29 have informed this constraints study.

Table 2-29: Extract of Measures from the GDA Transport Strategy 2022-2042

Measure	Description
PT1	**Steady-State Maintenance of Public Transport** The NTA and transport operators will ensure that existing public transport infrastructure, including roads, road markings and signage, and fleet will be maintained at a high standard and renewed at the appropriate time.
PT2	**Climate Proofing New Public Transport Infrastructure** The NTA will ensure that all new public transport infrastructure is proofed for resilience against the potential impacts arising from climate change.
PT3	**Resilience of the Public Transport Services** The NTA and transport operators will prepare a public transport resilience strategy for the GDA.

These measures highlight the importance of maintaining both transport infrastructure and its surrounding environment. By planning ahead, required interventions can be made while limiting disruptions to the transport network.

The existing and planned infrastructure within the five study areas has been examined to identify constraints relevant to each CCA. The following sections describe these constraints, as well as challenges facing transport in each area.

2.12.3 Constraints per CCA

2.12.3.1 CCA1 – Merrion Gates to Dún Laoghaire

The key existing transport infrastructure in CCA1 is:

- The DART rail line and associated infrastructure, including the following stations:
  - Sydney Parade;
  - Booterstown;
  - Blackrock;
  - Seapoint; and
  - Salthill and Monkstown.
- Rock Road and Frascati Road, which provide a north-south link for road traffic, as well as bus and cycle lanes in each direction;
- Multiple signalised road junctions including:
  - Merrion Gates junction and level crossing;
  - Booterstown Avenue/Rock Road junction;
  - Mount Merrion Avenue/Rock Road junction;
  - Carysfort Avenue/Frascati Road junction; and
  - Carrickbrennan Road/Monkstown Crescent junction.
- Booterstown-Blackrock Greenway which provides a high-quality pedestrian and cycle connection; and
- Other roads and footpaths.

Additionally, these proposed transport schemes will fall within the CCA1 study area:

- DART+ Coastal South, which will deliver increased capacity on the DART line;
- BusConnects Blackrock to Merrion corridor, involving upgrades to the existing road corridor to deliver bus priority and cycle tracks along Rock Road and Frascati Road; and
- The East Coast Trail (National Cycle Route 5), a cycle route forming part of the Transport Strategy's proposed cycle network, with the identified indicative route from Wexford to Dundalk mostly consisting of greenways.

The CCA1 study area is an urbanised area with high travel demand. Transport in this CCA faces the challenge of road congestion in peak periods, with areas of Rock Road and Frascati Road often experiencing delays in the AM and PM peak periods in particular. The transport network in this area provides for movement by car, bus, walking and cycling, and connects these modes to the DART stations.

2.12.3.2 CCA2-3 – Dalkey Tunnel to Killiney South

The key existing transport infrastructure in CCA2-3 is:

- DART rail line and associated infrastructure, including the following station:
  - Killiney
- Vico Road (R119), comprising a traffic lane in each direction with a narrow footpath on one side;
- "Cats Ladder" Steps, forming a pedestrian link between Vico Road and Torca Road; and
- Other roads and footpaths.

Additionally, these proposed transport schemes will fall within the CCA2-3 study area:

- DART+ Coastal South, which will deliver increased capacity on the DART line; and
- The East Coast Trail (National Cycle Route 5), a cycle route forming part of the Transport Strategy's proposed cycle network, with the identified indicative route from Wexford to Dundalk mostly consisting of greenways.

The CCA2-3 Study Area has very limited pedestrian and cycle connectivity. Where footpaths are provided, they are generally narrow and obstructed by infrastructure such as power poles. There is limited permeability and no dedicated pedestrian crossings or cycle lanes. It is therefore especially important not to impede on pedestrian or cycle connections in this area, as there are few if any alternative routes.

2.12.3.3 CCA5 – Bray Head

The key existing transport infrastructure in CCA5 is:

- DART rail line and associated infrastructure, including multiple railway tunnels through Bray head;
- Bray-Greystones Cliff Walk; and
- Several roads and footpaths, which do not pass through the study area but provide connections to residences and carparks.

Additionally, these proposed transport schemes will fall within the CCA5 study area:

- DART+ Coastal South, which will deliver increased capacity on the DART line; and
- The East Coast Trail (National Cycle Route 5), a cycle route forming part of the Transport Strategy's proposed cycle network, with the identified indicative route from Wexford to Dundalk mostly consisting of greenways.

While there are limited destinations in this area, requiring few transport links, the Bray-Greystones Cliff Walk forms an important leisure route linking the two towns. As a popular tourist destination, this walk is frequently accessed from Bray and Greystones DART stations.

2.12.3.4 CCA6.1 – Greystones to Newcastle

The key existing transport infrastructure in CCA6.1 is:

- DART/heavy rail line and associated infrastructure, including the following stations:
  - Greystones DART station;
  - Kilcoole train station; and
  - Newcastle train station (currently closed).
- Greystones Park and Ride;
- Church Road in Greystones town,
- Newcastle Aerodrome and Airfield; and
- Several access roads.

Additionally, this proposed transport scheme will fall within the CCA6.1 study area:

- The East Coast Trail (National Cycle Route 5), a cycle route forming part of the Transport Strategy's proposed cycle network, with the identified indicative route from Wexford to Dundalk mostly consisting of greenways.

In Greystones town, the transport network consists of several key roads linking various residential cul-de-sacs. There is a Park and Ride site approximately eight minutes' walk from the Greystones DART station. Throughout the rest of the study area, transport is predominantly by rail with few road or active travel connections.

2.12.3.5 CCA6.2 – Newcastle to Wicklow Harbour

The key existing transport infrastructure in CCA6.2 is:

- Heavy rail line and associated infrastructure, including the following stations:
  - Newcastle train station (currently closed); and
  - Wicklow station.
- Newcastle Aerodrome and Airfield;
- Wicklow Harbour; and
- Several access roads.

Additionally, this proposed transport scheme will fall within the CCA6.2 study area:

- The East Coast Trail (National Cycle Route 5), a cycle route forming part of the Transport Strategy's proposed cycle network, with the identified indicative route from Wexford to Dundalk mostly consisting of greenways.

The rail line forms the only north-south transport connection through the CCA6.2 study area; the few destinations north of Wicklow are connected by access roads to the inland road network.

2.13 Material Assets

2.13.1 Introduction

Material assets are resources of both natural and human origin that have intrinsic value. The EPA Guidelines on the Information to be Contained in EIARs (EPA 2022) discuss material assets as follows:

> '*In Directive 2011/92/EU this factor included architectural and archaeological heritage. Directive 2014/52/EU includes those heritage aspects as components of cultural heritage. Material assets can now be taken to mean built services and infrastructure. Traffic is included because in effect traffic consumes transport infrastructure. Sealing of agricultural land and effects on mining or quarrying potential come under the factors of land and soils.*'

2.13.2 Methodology

Given that this constraints report includes separate sections for archaeological and cultural heritage, architectural heritage, traffic and transport, and soils and geology, this section of the report will focus on built services and infrastructure, namely major infrastructure and utilities.

Major infrastructure will include any significant physical infrastructure within the study area. Utilities will cover the utilities and services that are located within the study area, namely:

- Electricity;
- Gas;
- Water/wastewater; and
- Telecommunications infrastructure.

The following sections outline the baseline and key material assets constraints in each of the five study areas.

2.13.3 Constraints Per CCA

2.13.3.1 CCA1 – Merrion Gates to Dún Laoghaire

2.13.3.1.1 Major Infrastructure

There are a number of important pieces of infrastructure located within the study area for CCA1 (refer to Figure 8.1 - CCA1). These mainly include transport infrastructure and recreational infrastructure. The most significant piece of infrastructure is the railway line, including five railway stations, a significant level crossing and other associated infrastructure. Through the study area, this predominantly follows the coastline. There are also a number of roads within the study area, generally to the landside of the railway line, except in the north-western and south-eastern ends of the study area where the railway line moves more inland.

In addition to that major transport infrastructure, part of the West Pier, Marina and other associated infrastructure at Dún Laoghaire Harbour is located within the south-eastern end of the study area. The area of the harbour within the study area includes car parking, mooring areas, quays/wharfs, boatyards, pontoons, a marina fuelling station, harbour roads, slipways and walkways. The part of the harbour within the study area would generally cater to smaller boats, small yachts and recreational boats and activities like sailing, kayaking and paddleboarding.

The West Pier Pumping Station is located at the western end of Dún Laoghaire Harbour. This piece of major infrastructure serves the Dún Laoghaire West Pier Drainage Areas (Blackrock, Monkstown, Stillorgan, Sandyford, Dún Laoghaire, Glasthule, Dalkey and Sallynoggin). Wastewater from these areas flows to the Pumping Station and are then pumped across to the Ringsend Wastewater Treatment Plant for treatment via sewer lines under the bay.

Between Dún Laoghaire and Blackrock, there are a number of small pieces of recreational infrastructure located along the coastline, in particular some small slipways and steps into the water for the use of swimmers and small boats at Seapoint. There is also the site of the Blackrock Baths beside Blackrock DART Station; however, this has been partly demolished and is no longer in use. Blackrock Park is also located within the study area. This park runs along the coast on the inland side of the railway line, and includes walking trails, playgrounds, water features, a café and a bike pump track.

2.13.3.1.2 Utilities

There are a number of utility lines and pieces of infrastructure within the study area. All utility infrastructure is located on land in this area, with the exception of one high pressure gas main located through Merrion Strand, and wastewater lines coming from West Pier Pumping Station out into the bay north of Dún Laoghaire Harbour. The utilities within the study area are summarised in Table 2-30.

Table 2-30: Summary of the Utility Infrastructure within the CCA1 Study Area

Utility Type	Description
Power	High voltage underground cables (38kV-220kV) predominantly following the main roads and the railway line within the study area. Medium voltage underground cables predominantly following the main roads through the study area. Low voltage underground cables and overhead lines predominantly branching off from the main roads into the smaller roads to feed into the end users i.e., residential, commercial and community properties. 38kV station in Blackrock Park.
Gas	High pressure gas main along the Merrion Road / Rock Road, through Blackrock Park, Blackrock Main Street and Newtown Avenue. There is also a high pressure gas main crossing the Merrion Road and going out towards the sea. Medium pressure gas mains along the Merrion Road between St Vincent's Hospital and Elm Park, at Blackrock Clinic and along Seapoint Avenue towards Dún Laoghaire. Low pressure gas mains along a number of roads throughout the study area.
Water	Water mains and associated infrastructure along most of the roads within the study area
Wastewater	Sewer mains and associated infrastructure along most of the roads within the study area. There are a mix of combined and foul sewers through the area. West Pier Pumping Station is located on the coast to the west of Dún Laoghaire Harbour, in the south-eastern end of the study area.
Telecommunications	Telecommunications lines and infrastructure along most of the roads in the study area from a number of providers.

2.13.3.2 CCA2-3 – Dalkey Tunnel to Killiney South

2.13.3.2.1 Major Infrastructure

There are a number of important pieces of infrastructure located within the study area for CCA2-3 (refer to Figure 8.1 – CCA2/3). These mainly include transport infrastructure and recreational infrastructure. The most significant piece of infrastructure is the railway line, including two railway stations and associated infrastructure. Through the study area, this predominantly follows the coastline and includes a short tunnel section in Dalkey. There are also a number of roads within the study area, generally to the landside of the railway line, except in the northern and southern ends of the study area where the railway line moves more inland.

There is minimal other major infrastructure within this study area. Most other infrastructure of note would be associated with recreational uses connected to Killiney Beach. This includes the Vico Baths in the northern part of the study area, an access point including steps to the water, and changing facilities at Hawk Cliff. Along Killiney Beach itself there are a number of items including some kiosks/small buildings (intermittently used as changing facilities), a lifeguard station and a car park.

In the southern end of the study area is the Shanganagh Wastewater Treatment Plant. This is an important treatment plant as it serves a large area of Dún Laoghaire-Rathdown and north Wicklow, serving areas including Stepaside, Carrickmines, Leopardstown, Deansgrange, Cabinteely, Killiney, Loughlinstown, Shankill and Bray.

2.13.3.2.2 Utilities

There are a number of utility lines and pieces of infrastructure within the study area. All utility infrastructure is located on land in this area, with the exception of a wastewater outfall line located out into Killiney Bay from the Shanganagh Wastewater Treatment Plant. The utilities within the study area are summarised in Table 2-31.

Table 2-31: Summary of the Utility Infrastructure within the CCA2-3 Study Area

Utility Type	Description
Power	Medium voltage underground cables mainly along Station Road in Killiney. Low voltage underground cables and overhead lines following most of the roads within the study area.
Gas	Medium pressure gas mains along roads within the vicinity of Ballybrack, particularly within the Seafield / Bayview areas. Low pressure gas mains along a number of roads throughout the study area.
Water	Water mains and associated infrastructure along most of the roads within the study area.
Wastewater	Sewer mains and associated infrastructure along most of the roads within the study area. There are a mix of combined and foul sewers through the area. Shanganagh Wastewater Treatment Plant is located on the coast in the south of the study area.
Telecommunications	Telecommunications lines and infrastructure along some of the roads in the study area from a number of providers.

2.13.3.3 CCA5 – Bray Head

2.13.3.3.1 Major Infrastructure

There are a number of important pieces of infrastructure located within the study area for CCA5 (refer to Figure 8.1 – CCA5). These mainly include transport infrastructure and recreational infrastructure. The most significant piece of infrastructure is the railway line and associated infrastructure. Through the study area, this predominantly follows the coastline and includes a number of tunnel sections through Bray Head. There are also a number of roads within the study area, mainly at the Bray and Greystones ends of the area. They are generally to the landside of the railway line, except in the northern and southern ends of the study area where there some roads to the seaside of the railway line.

The majority of the major infrastructure within the study area is related to the railway line. There are some other more minor recreational infrastructure features, specifically walking trails on and around Bray Head, including the Bray to Greystones Cliff Walk (currently closed due to rock slides), a car park on the northern side of Bray Head, and Greystones Marina Park (which includes a dog park and a playground).

2.13.3.3.2 Utilities

There are a number of utility lines and pieces of infrastructure within the study area, although given the relative lack of properties in the majority of the study area due to Bray Head taking up a substantial amount of it, there are relatively few utilities compared to the other study areas. Most utilities are located in the northern and southern end of the study area, with some towards the centre serving the properties along Cliff Road on the southern side of Bray Head. All utility infrastructure is located on land in this area. The utilities within the study area are summarised in Table 2-32.

Table 2-32: Summary of the Utility Infrastructure within the CCA5 Study Area

Utility Type	Description
Power	High voltage overhead line in the Rathdown area of Greystones Medium voltage underground cable and overhead line on Cliff Road on Bray Head. Low voltage underground cables and overhead lines in the northern part of the study area at Bray, on Cliff Road on Bray Head and in the Rathdown area of Greystones. 38kV station in Greystones end of the study area.
Gas	Medium pressure gas mains on Cliff Road on Bray Head and in the Rathdown area of Greystones. Low pressure gas mains along a number of roads in the Bray end of the study area.
Water	Water mains and associated infrastructure in the northern part of the study area at Bray, on Cliff Road on Bray Head and in the Rathdown area of Greystones.
Wastewater	Sewer mains and associated infrastructure in the northern part of the study area at Bray (combined sewers) and in the Rathdown area of Greystones (foul sewers).
Telecommunications	Telecommunications lines and infrastructure serving a number of locations in the study area.

2.13.3.4 CCA6.1 – Greystones to Newcastle

2.13.3.4.1 Major Infrastructure

There are a number of important pieces of infrastructure located within the study area for CCA6.1 (refer to Figure 8.1 – CCA6.1). These mainly include transport infrastructure and recreational infrastructure. The most significant piece of infrastructure is the railway line, including three railway stations and other associated infrastructure. Through the study area, this predominantly follows the coastline. There are also a number of roads within the study area, generally to the landside of the railway line, except in the northern end of the study area where there some roads to the seaside of the railway line.

In addition to that major transport infrastructure, part of the Greystones Harbour and Marina are located in the northern end of the study area. This infrastructure includes car parking, mooring areas, quays/piers, slipways and walkways. Significant works have been done in recent years at this location, including the construction of the marina and installation of rock armour to protect the piers. There are also a number of other public car parks in close proximity to the coast in Greystones.

Within Greystones there are a number of pieces of recreational infrastructure within the study area, including playing pitches/sports facilities, golf courses, parks and playgrounds. South of Greystones, the land becomes more rural in character with fewer areas of major infrastructure. The most significant infrastructure south of Greystones is Newcastle Aerodrome which includes a 690m grass runway and some buildings which house the airport services.

There are three wastewater treatment plants within this study area. These are:

Greystones WwTP, serving Greystones and Delgany;
Kilcoole WwTP, serving Kilcoole; and
Newcastle WwTP, serving Newcastle.

The Greystones WwTP is the most significant of these three, given the size and population of the Greystones-Delgany agglomeration area. Kilcoole WwTP is smaller than Greystones by a factor of 10, while Newcastle WwTP is the smallest of the three.

2.13.3.4.2 Utilities

There are a number of utility lines and pieces of infrastructure within the study area. All utility infrastructure is located on land in this study area, except for outfall from the Greystones Wastewater Treatment Plant which is into the Irish Sea. The utilities within the study area are summarised in Table 2-33.

Table 2-33: Summary of the Utility Infrastructure within the CCA6.1 Study Area

Utility Type	Description
Power	High voltage underground cables and overhead lines (generally 38kV) predominantly in the western part of the study area. Medium voltage underground cables and overhead lines predominantly following the main roads through the study area. Low voltage underground cables and overhead lines predominantly branching off from the main roads into the smaller roads to feed into the end users i.e., residential, commercial and community properties. 38kV station adjacent to the railway line in the northern part of the study area; Greystones 38kV station in the south-western part of Greystones; and Kilcoole 38kV station in the western edge of Kilcoole.
Gas	Medium pressure gas mains along roads throughout Greystones and Kilcoole. Low pressure gas mains serving a number of areas in Greystones and Delgany.
Water	Water mains and associated infrastructure along roads in built up areas within the study area.
Wastewater	Sewer mains and associated infrastructure in built up areas. There are a mix of combined and foul sewers through the study area. Greystones Wastewater Treatment Plant in the north of the study area; Kilcoole Wastewater Treatment Plant near the centre of the study area; and Newcastle Wastewater Treatment Plant in the south of the study area.

Utility Type	Description
Telecommunications	Telecommunications lines and infrastructure along roads in built up areas within the study area from a number of providers.

2.13.3.5 CCA6.2 – Newcastle to Wicklow Harbour

2.13.3.5.1 Major Infrastructure

There are a number of important pieces of infrastructure located within the study area for CCA6.2 (refer to Figure 8.1 – CCA6.2). These mainly include transport infrastructure and recreational infrastructure. The most significant piece of infrastructure is the railway line, including two railway stations and other associated infrastructure. Through the study area, this predominantly follows the coastline until just north of Wicklow town where it turns westward and proceeds inland. There are also a number of roads within the study area, generally to the landside of the railway line, except in the southern end of the study area where there some roads to the seaside of the railway line in Wicklow town.

In addition to that major transport infrastructure, Wicklow Harbour is located in the southern end of the study area. This is a small commercial harbour which includes car parking, mooring areas, quays/piers, slipways, a lifeboat station, a lifeguard station, storage areas and a light house. Extending inland from that harbour area is Wicklow Port along the mouth of the River Vartry, which includes mooring quays on both side of the river.

Within Wicklow Town there are a number of pieces of recreational and community infrastructure within the study area, including playing pitches/sports facilities, golf courses, parks and playgrounds. North of Wicklow Town, the land becomes more rural in character with fewer areas of major infrastructure. The most significant infrastructure north of Wicklow Town is Newcastle Aerodrome, which includes a 690m grass runway and some buildings which house the airport services.

There are two wastewater treatment plants within this study area. These are:

Newcastle WwTP, serving Newcastle; and
Wicklow WwTP, serving Wicklow Town.

The Wicklow WwTP is the most significant of these, given the size and population of the Wicklow agglomeration area. Newcastle WwTP serves a much smaller population centre.

2.13.3.5.2 Utilities

There are a number of utility lines and pieces of infrastructure within the study area. All utility infrastructure is located on land in this study area, except for outfall from the Wicklow Wastewater Treatment Plant which is into the Irish Sea. The utilities within the study area are summarised in Table 2-34.

Table 2-34: Summary of the Utility Infrastructure within the CCA6.2 Study Area

Utility Type	Description
Power	High voltage overhead lines and underground cables (generally 38kV) predominantly in the southern half of the study area. Also 110/220 kV overhead lines in the south-western edge of the study area. Medium voltage underground cables and overhead lines predominantly following the main roads through the study area. Low voltage underground cables and overhead lines predominantly branching off from the main roads into the smaller roads to feed into the end users i.e., residential, commercial and community properties. Kilmartin 38kV station in the western edge of the study area south of Newcastle; and Ballybeg 110kV station on the western edge of Wicklow Town/Rathnew.
Gas	High pressure gas main along the western edge of the study area. Medium pressure gas mains along roads throughout Wicklow Town. Low pressure gas mains serving a number of areas in Wicklow Town.
Water	Water mains and associated infrastructure along roads in built up areas within the study area.
Wastewater	Sewer mains and associated infrastructure in built up areas. There are a mix of combined and foul sewers through the study area. Newcastle Wastewater Treatment Plant in the north of the study area; Wicklow Wastewater Treatment Plant in the south of the study area.
Telecommunications	Telecommunications lines and infrastructure along roads in built up areas within the study area from a number of providers.

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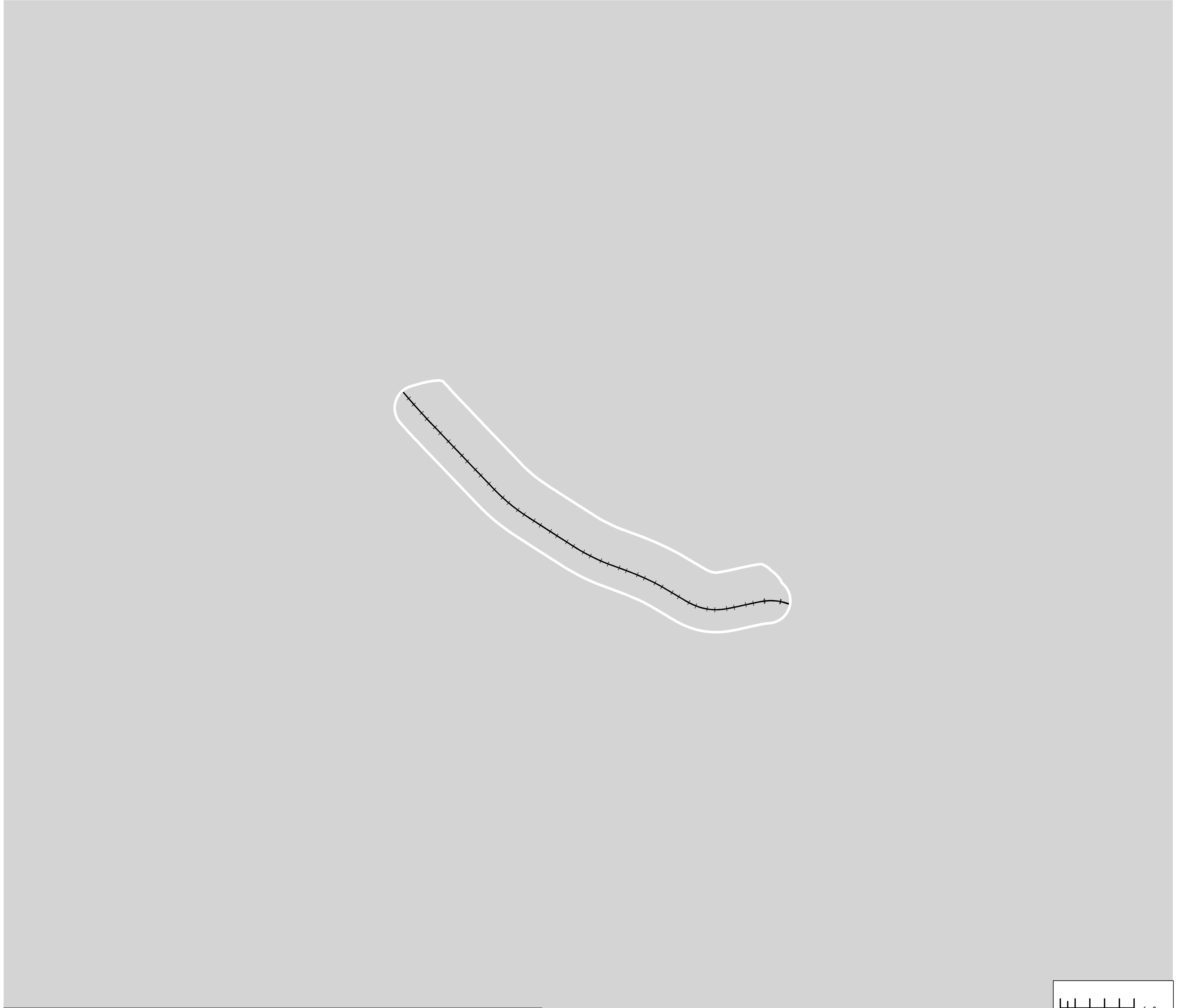

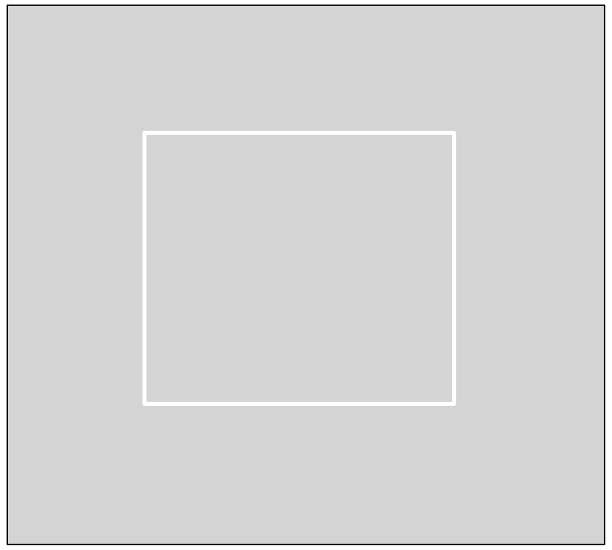

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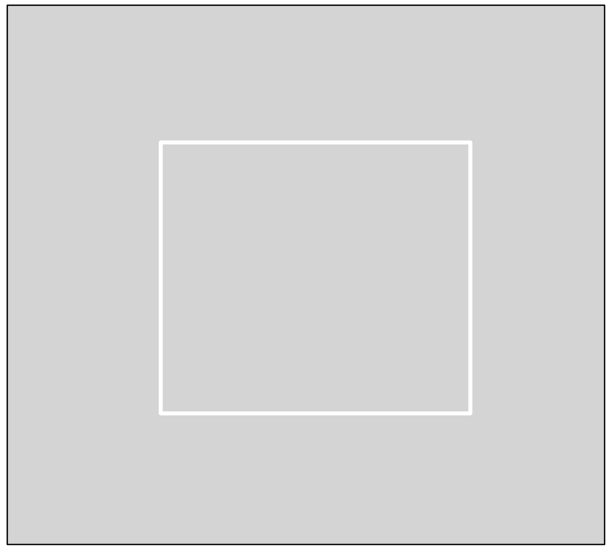

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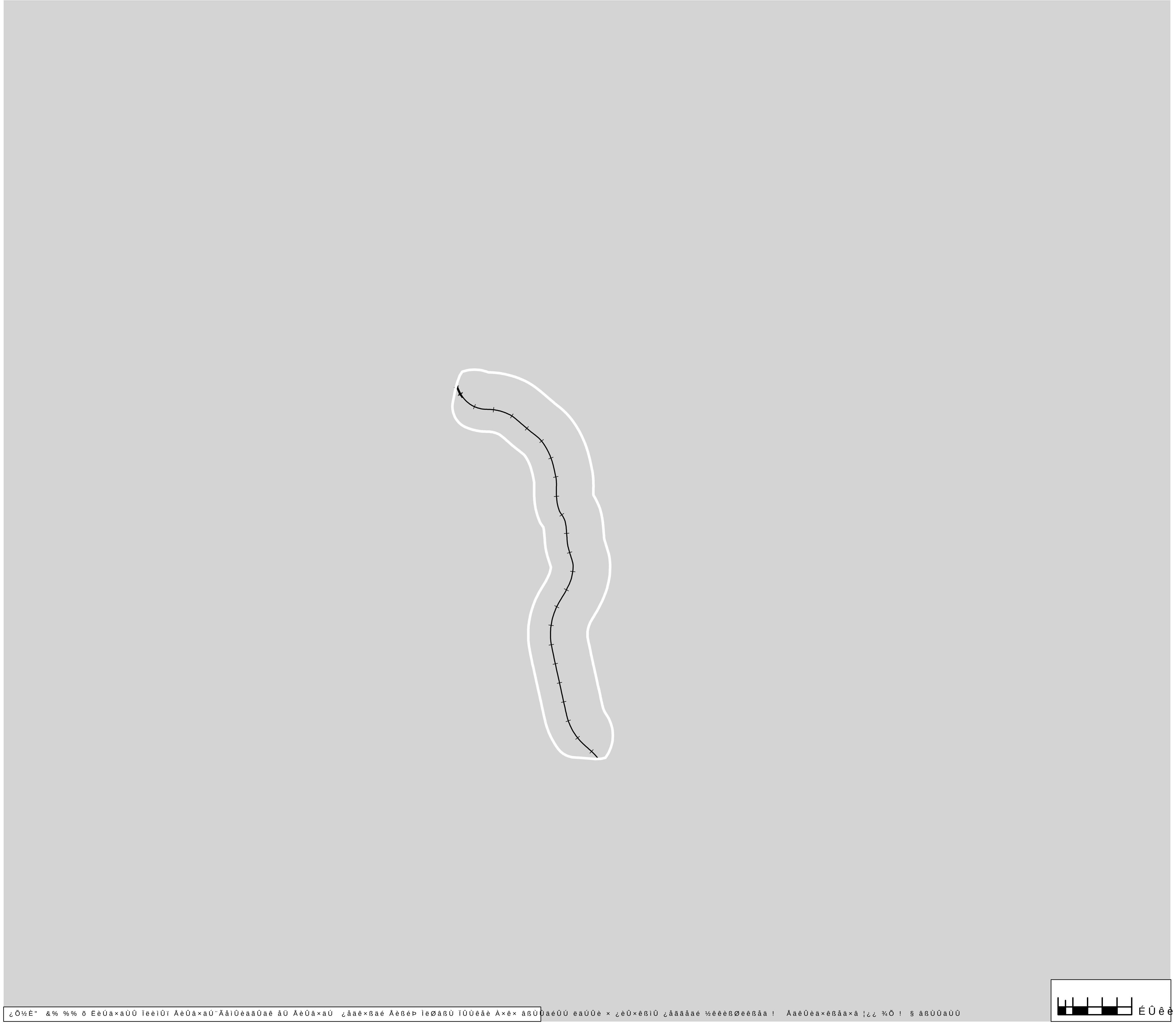

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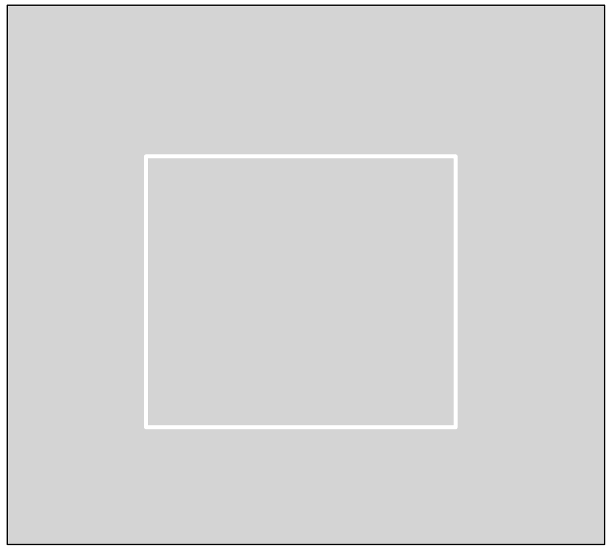

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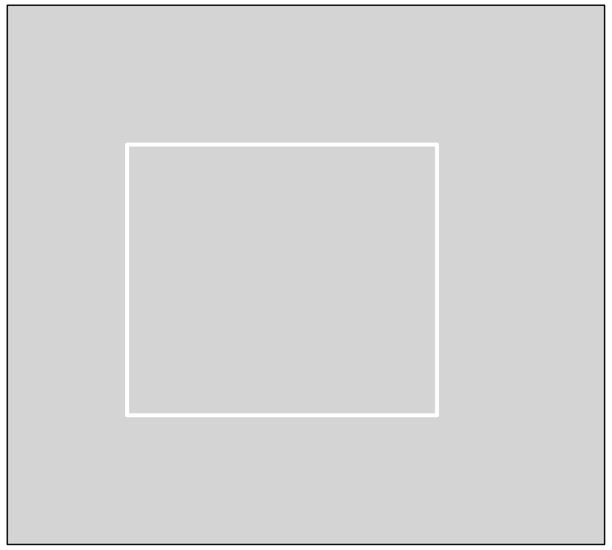

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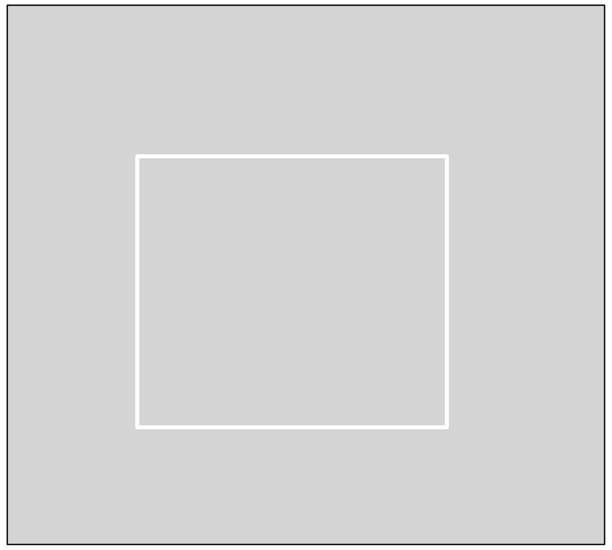

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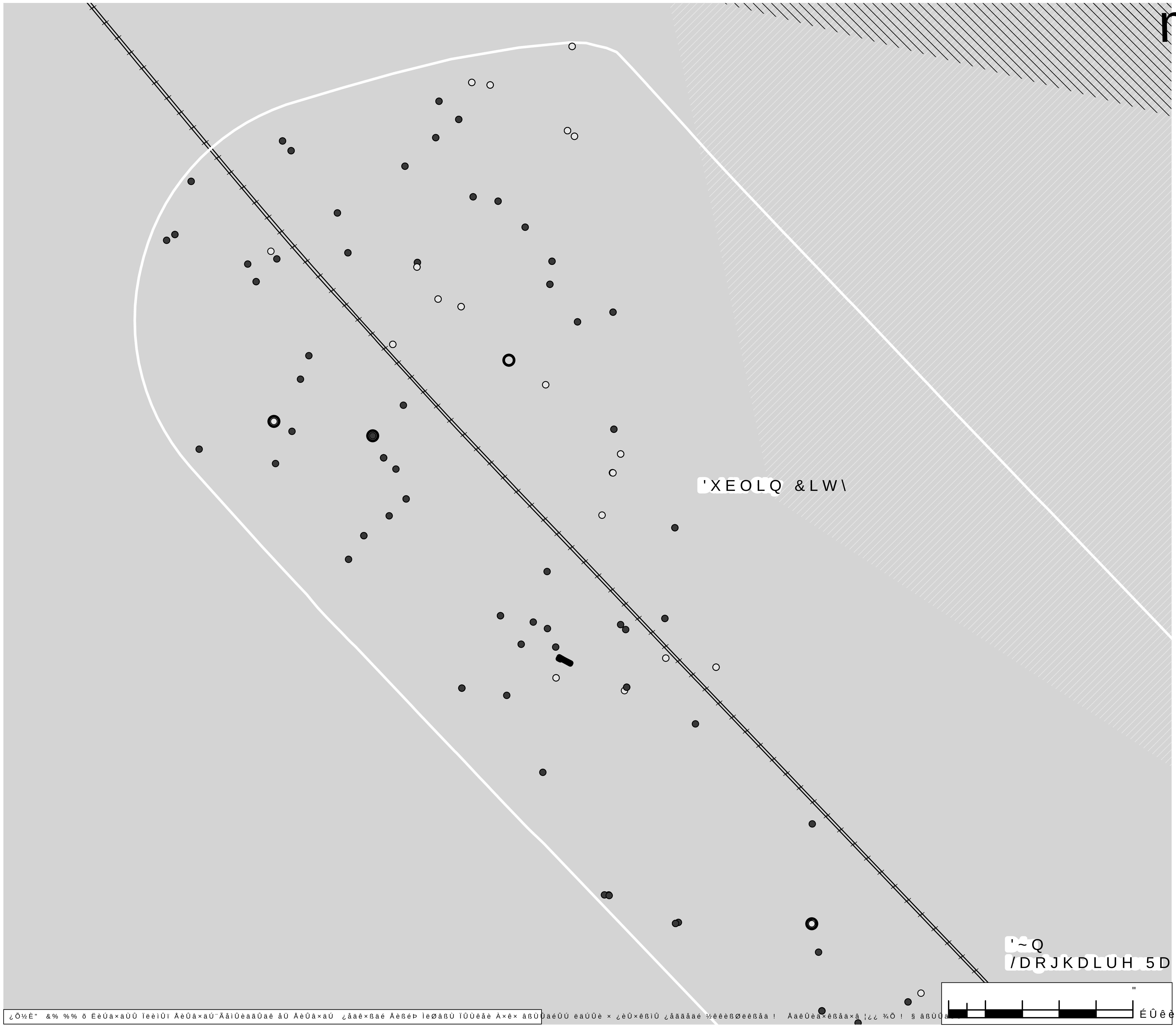

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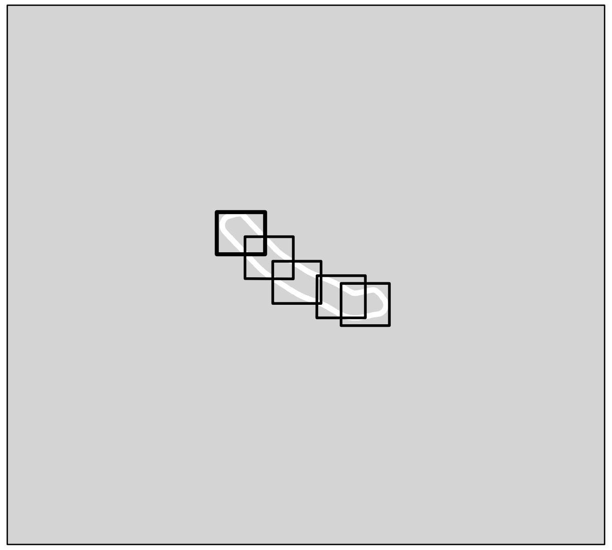

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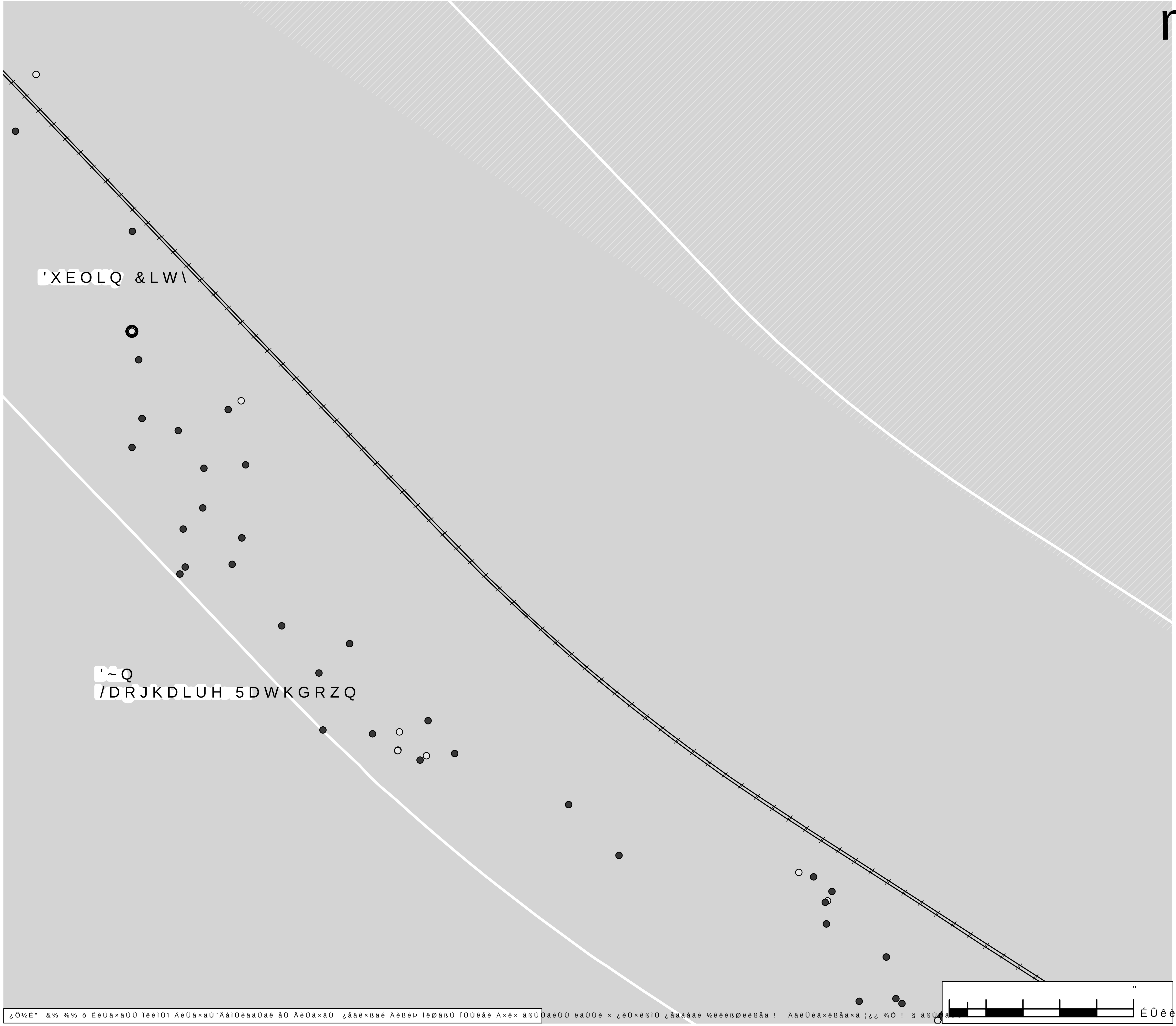

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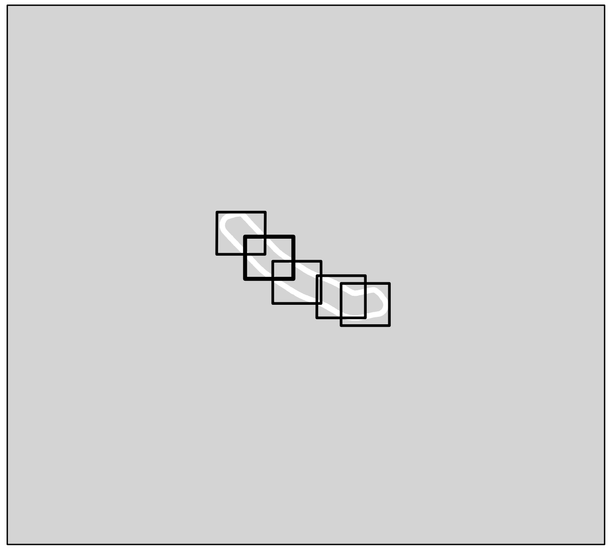

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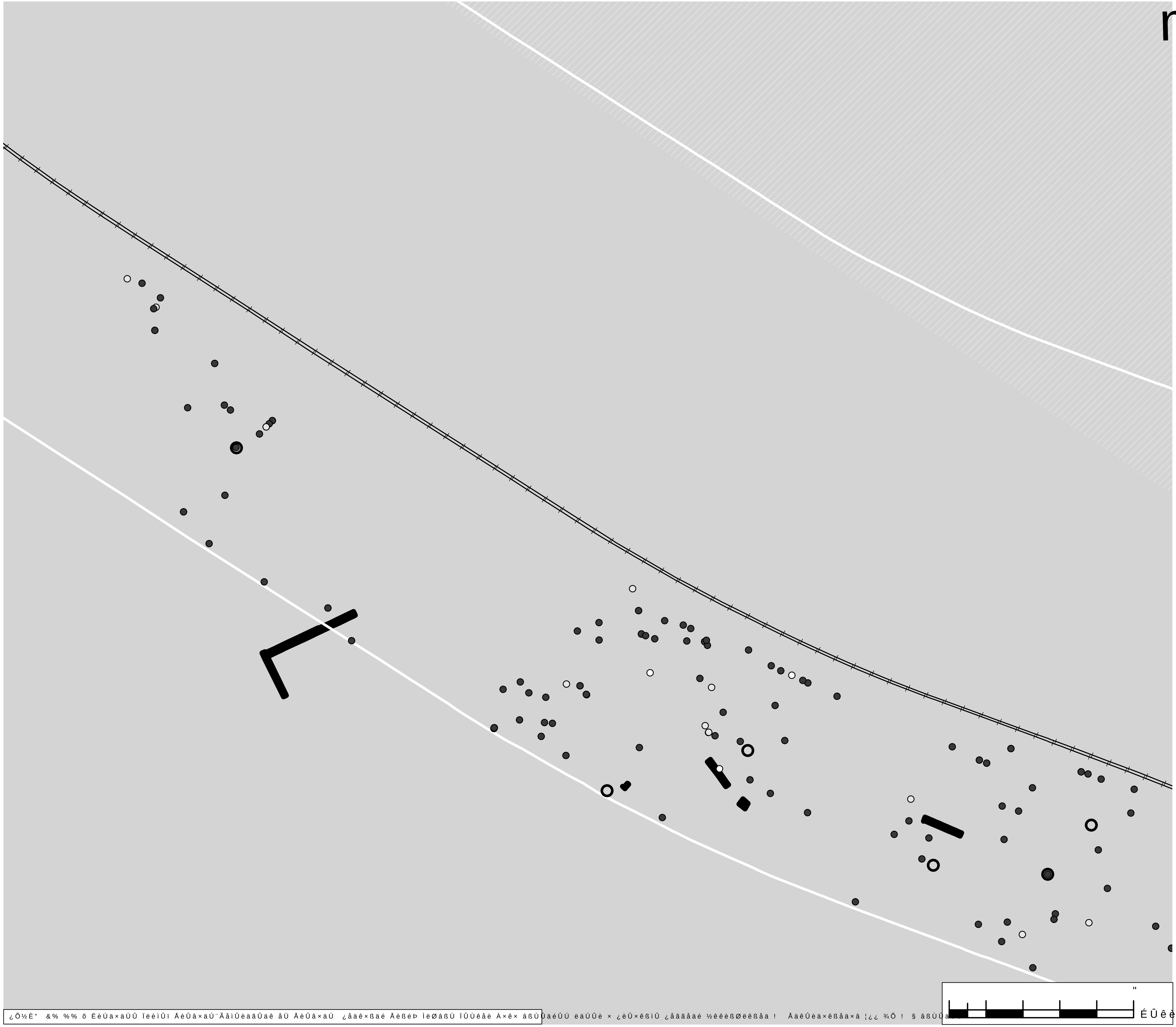

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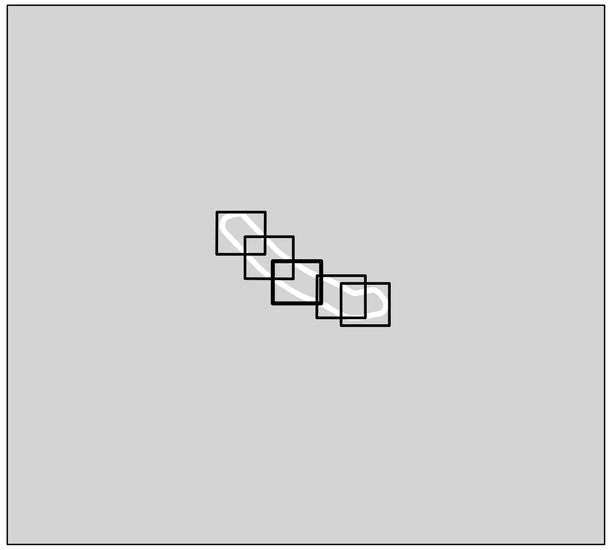

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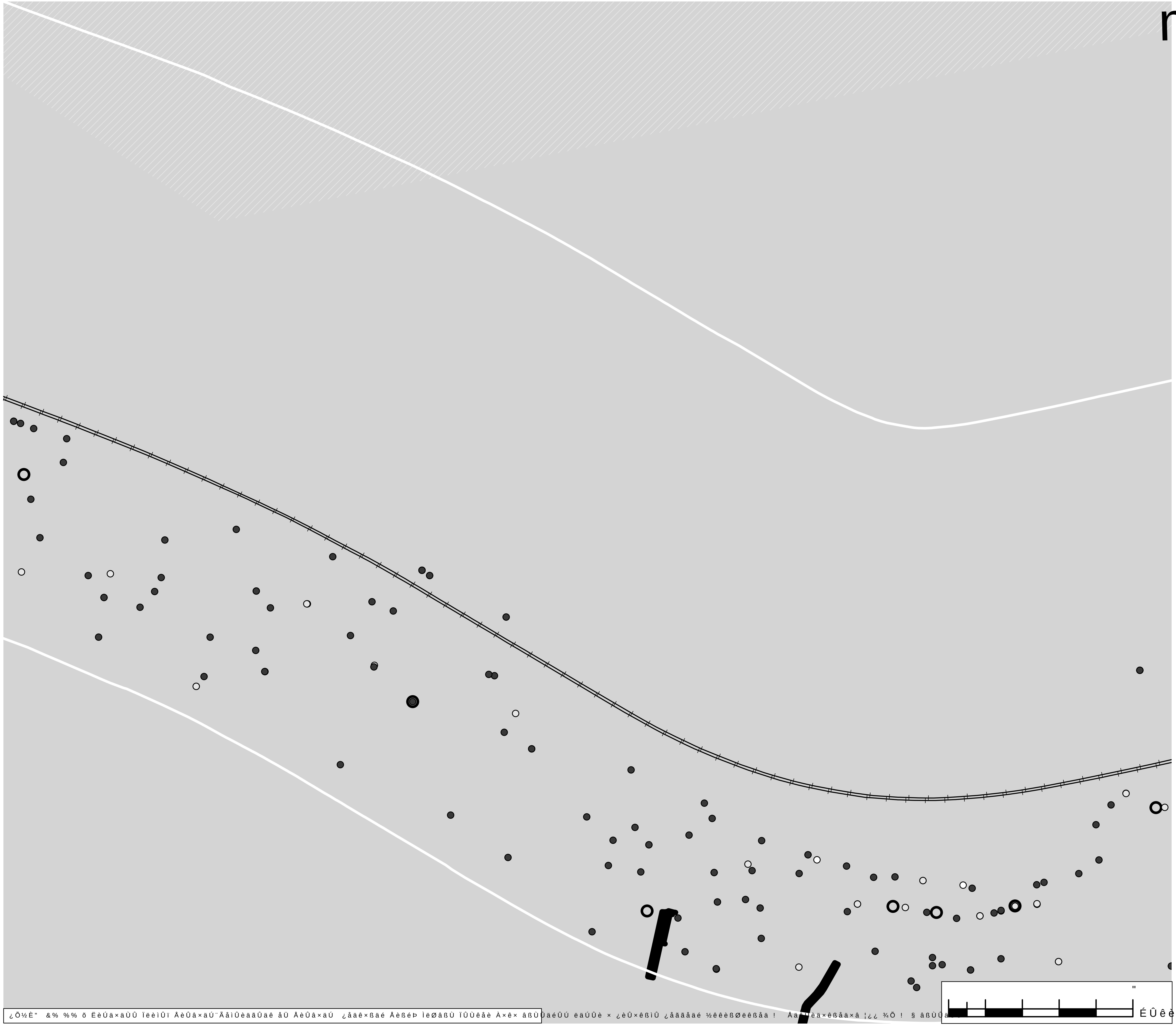

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- ○ /LYH

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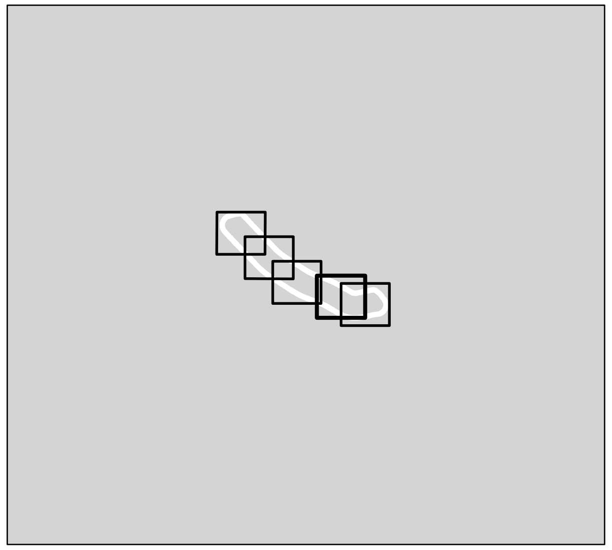

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'UDZLQJ 6WDWXV ÂÏÎÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

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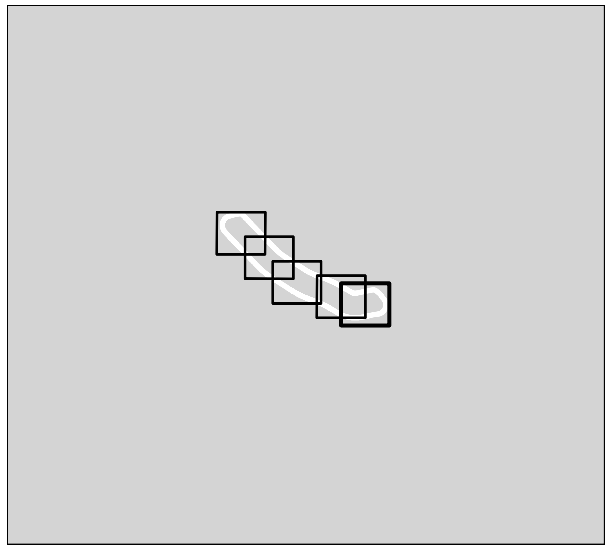

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'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

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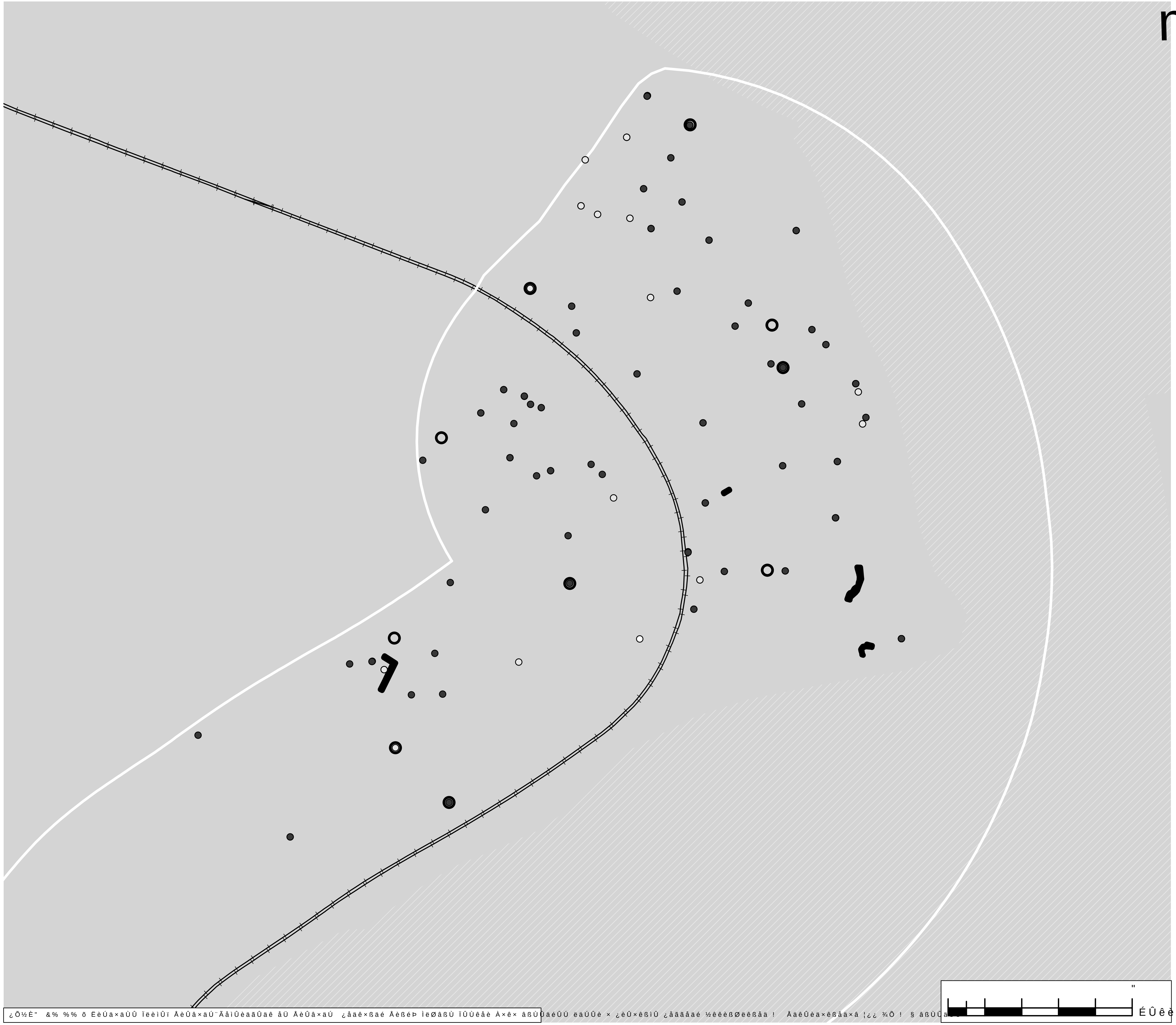
Ì×êÞ ©©ÝØâåå ìé ©ÂÅÏÌèåä©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥Áäìßèåäãäê×â¥¿åäéëê×ßäê¥ÎÛæåèê© ¥Å



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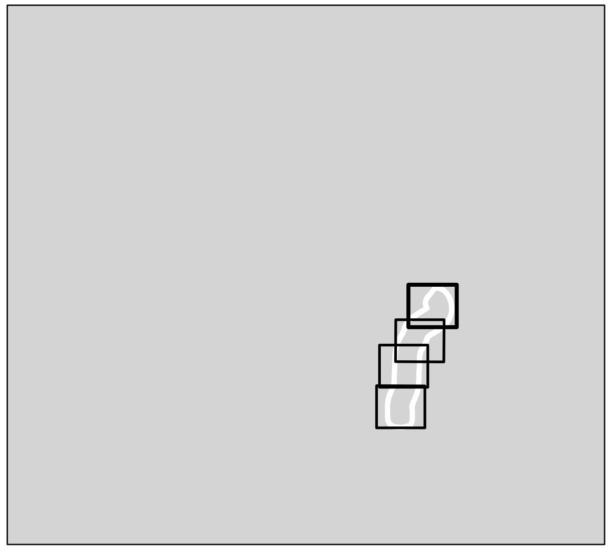

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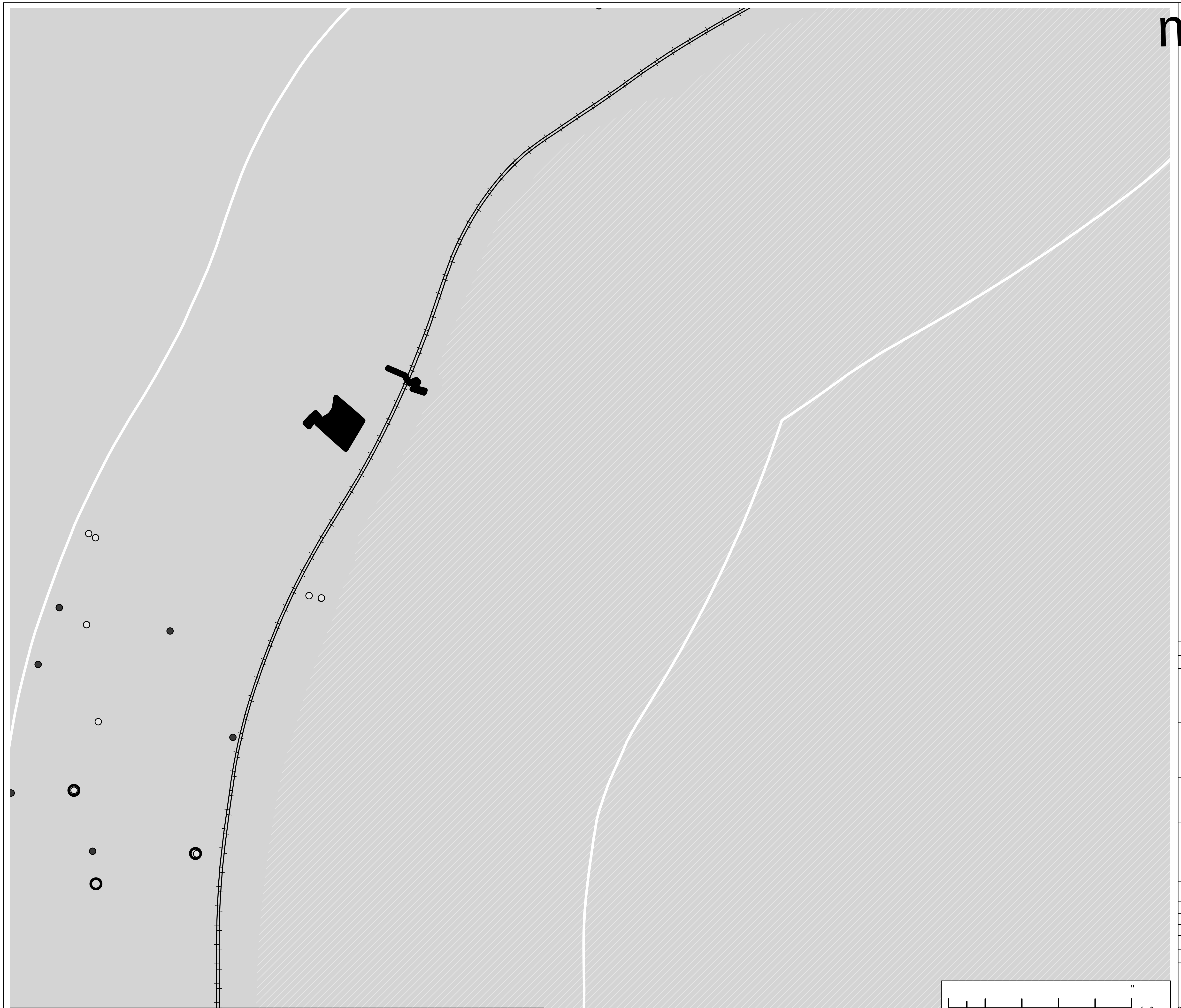
Ì×êÞ ©©ÝØâåä ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥Áäìßèåää Ûäê×â¥¿åäéêè×äêé¥ÎÛæåèê©



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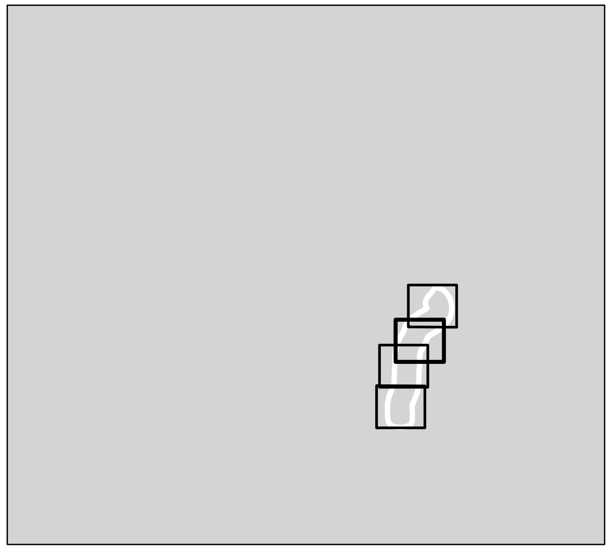

Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
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Ì×êÞ ©©ÝØâåå ìé ©ÃÅÏÌèåàÛÙ©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥ÁäìßèåäãÛäê×â¥¿åäéëåé×ßéê¥ÎÛæåèê©

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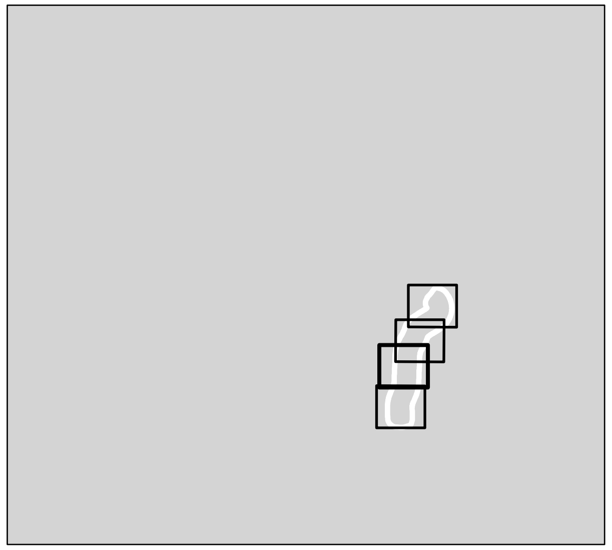

ÂÈÏÎÆÅ

ÉÛèèßåä ÄåêÛé ÉÛèèßåä ÎÙ ÀèØåßå!
ÅèÙâ×äÙ À!Î¿" ÐÛå k" #&"###

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÂËÊ ÌÎËÆÁ¿

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'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

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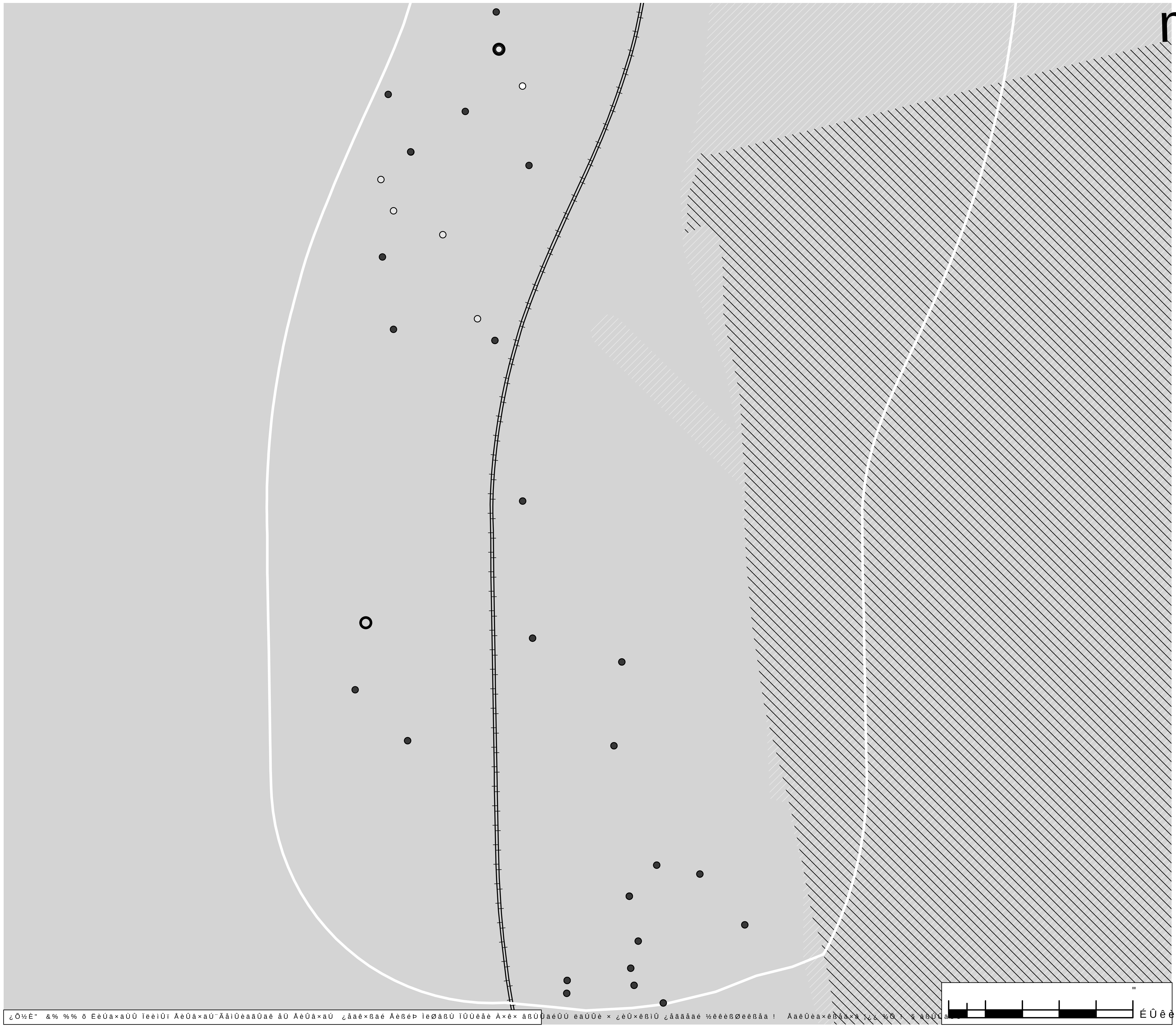

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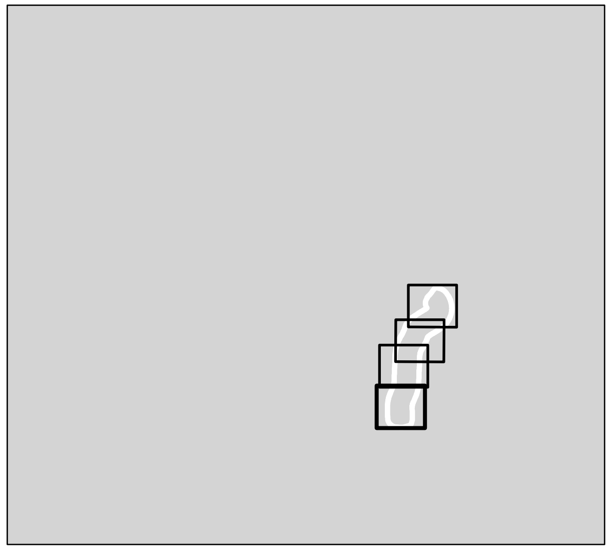

Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
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ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
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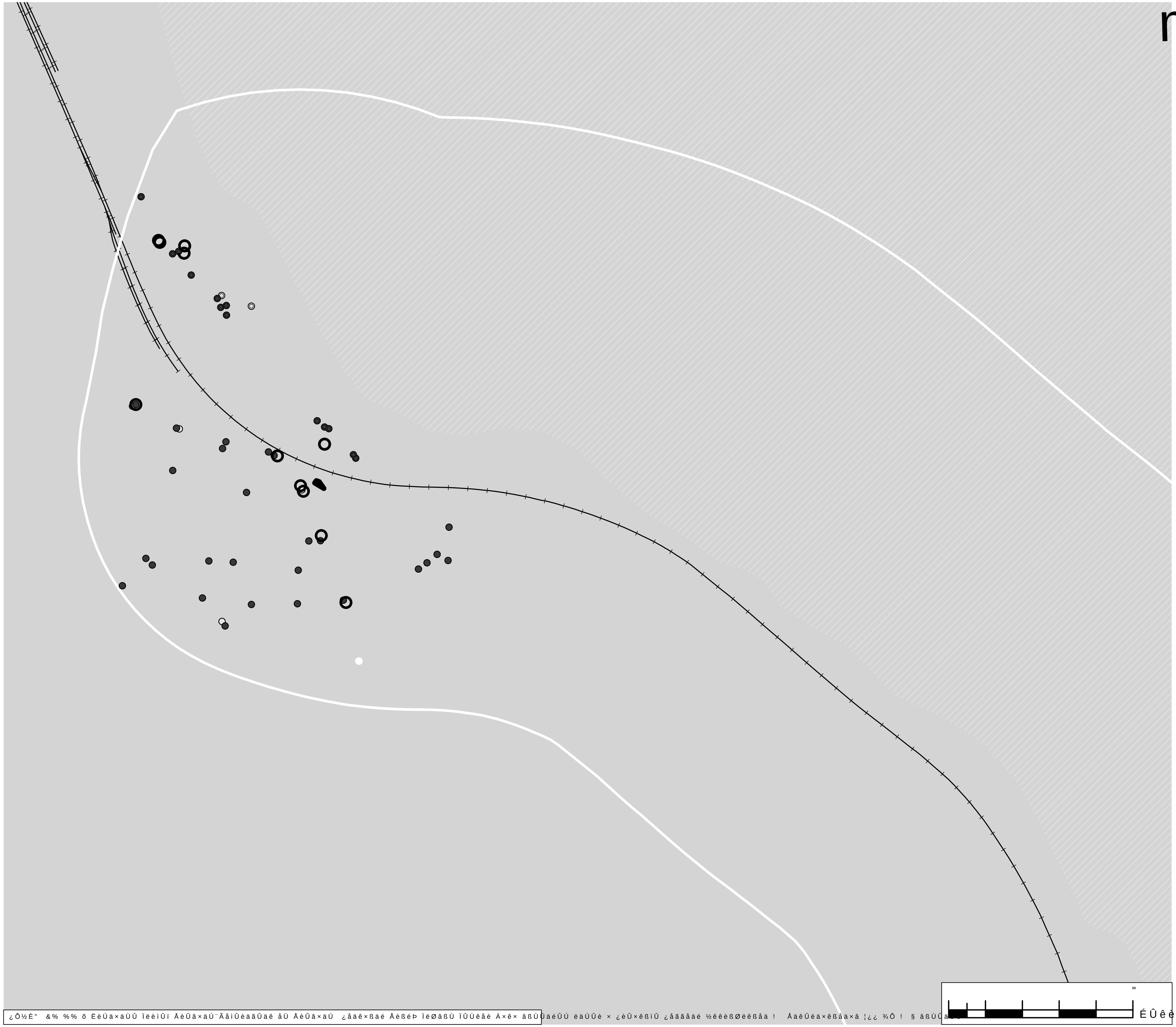
Ì×êÞ ©©ÝØâåå ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥Áäìßèåäã Ûäê×â¥¿åäéêè×ßäêé¥ÎÛæåèê© ¥



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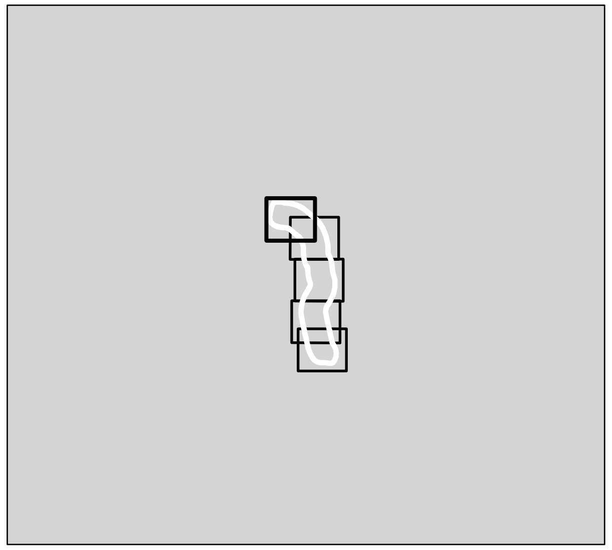

Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
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õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ Èßãßêä ÛÚ
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íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ×
ÙåæïèßÝÞê Èßãßê×êßåä ÐÞßé Úè×íßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ
Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßééëÛÚ ßä ×ÙÙåèÚ
ØÛêíÛÛä Æ×ÙåØé ×äÚ êÞÛ ¿âßÛäê Æ×ÙåØé ×ÙÙÛæêé äå âß×Ø
èÛéæÛÙê åÜ ×äï ëéÛ åÜ åè èÛâß×äÙÛ ëæåä êÞßé Úè×íßäÝ Øï

Ì×êÞ ©©ÝØåäé ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌ©½èÙÃÅÏ© &¥ÁäìßèåääãÛäê×â¥¿åäéêè×ßäêé¥ÎÛæåèêé©

ÂÅÃÑÎÁ

/HJHQG

&&$ 6WXG\ $UHD

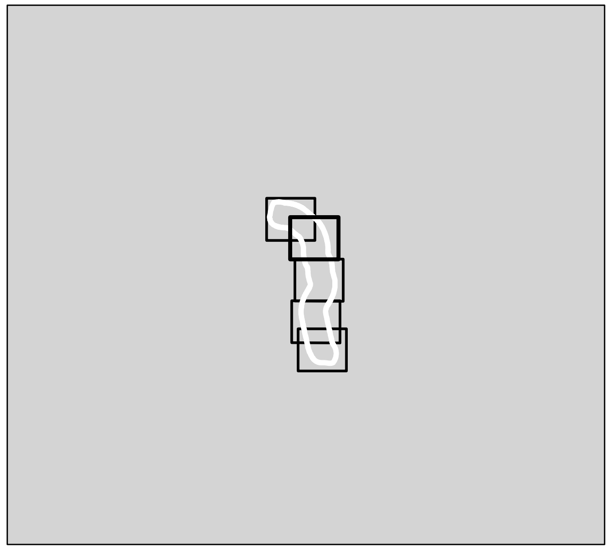
5DLOZD\ 1HWZRUN &HQWUHOLQ

'+/*+)RUHVKRUH 2IIVKRUH 5HQHZDEOH (QHUJ\ 'DWD

▨ 'HWHUPLQDWLRQ

5HIHUHQFH IRU '+/*+

$:LQG
% :DYH
& 7LGDO
' &RPELQDWLRQ



Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		Ìëèæåé Û åÜ èÛìßéßåä	Àè×í	ä¿ÞÛÙ	áÎ₩ì	Ú½ææè Ú

¿âßÛäê

ÀÛéßÝäÛè

ÉÛèèßåä ÄåëéÛ ÉÛèèßåä ÎÚ ÀëØâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ùåã

Ìèåà ÛÙê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ Ðßêâ Û

ÂßÝëèÛ
¿¿½"Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×äÚ
¦Ì×ÝÛ åÜ "§

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

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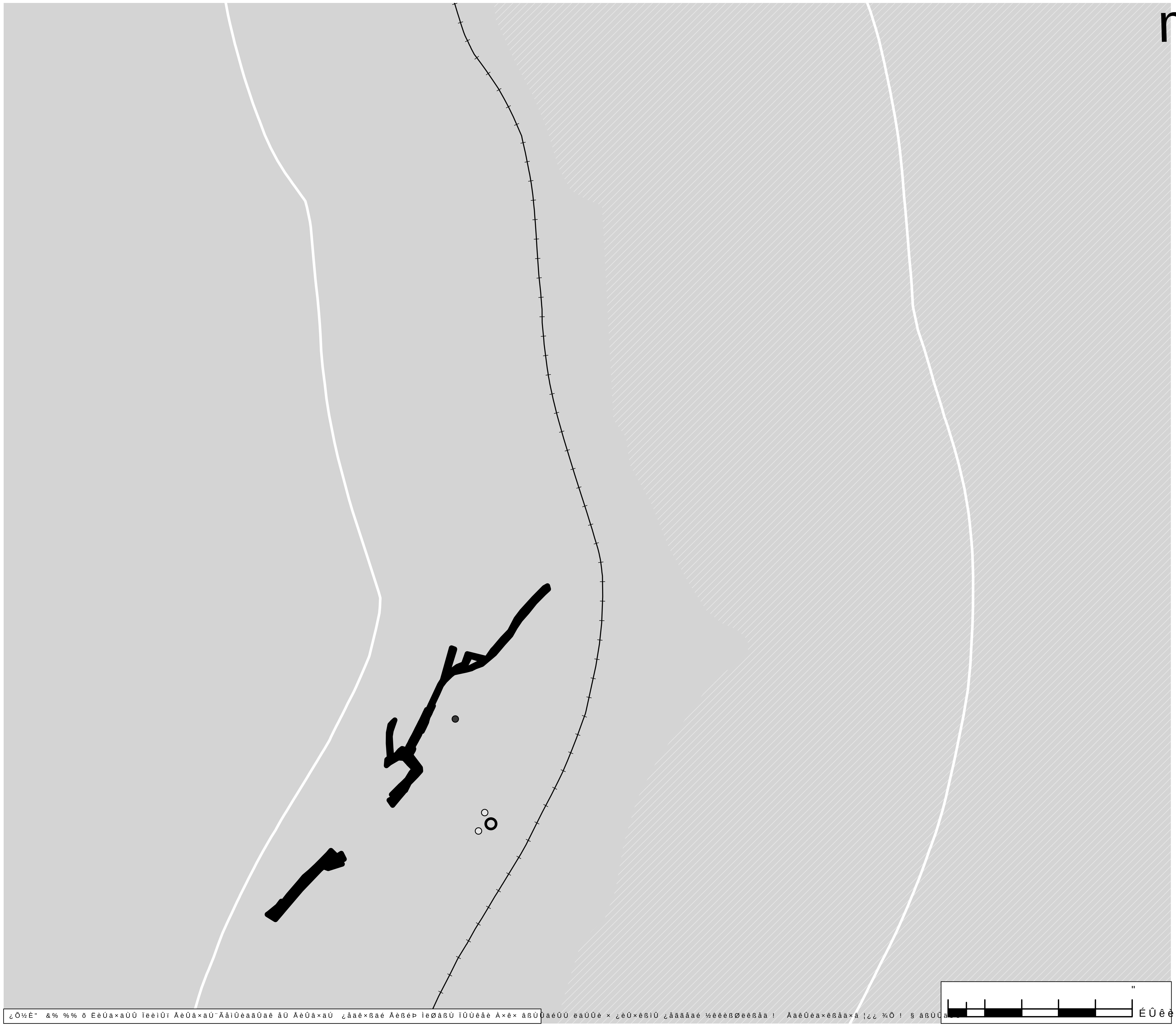
ÏÙ×âÛ Ž ½	"	ÀË ÊËÐ Ï¿½ÈÁ	
Æ×ÙåØé Êå	À #"%	ÎÛì	Ò
¿âßÛäê Êå	% &		
Àè×íßäÝ Êå	&&$ 3 ':* (9 -$&		

õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ ÈßãßêÛÚ ÙåäêÛ×ßäÛÚ ßä êÞßé ÚåÙëãÛäê ×èÛ êÞÛ æèåæÛèêï åÜ Æ×ÙåØé íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ× ÙåæïèßÝÞê ÈßãßêÛ×êßåä ÐÞßé Úè×íßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßéééëÛÚ ßä ×ÙÙåèÚ ØÛêíÛÛä Æ×ÙåØé ×äÚ êÞÛ ¿âßÛäê Æ×ÙåØé ×ÙÙÛæêé äå âß×Ø èÛéæåÛÙê åÜ ×äï ëéÛ åÜ åè èÛâß×äÙÛ ëæåä êÞßé Úè×íßäÝ Øï

Ì×êÞ ©©ÝØâåå ìé ©ÃÅÏÌèååà©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥ÁäìßèåäãÛäê×â¥¿åäéêè×ßäêé¥ÎÛæåèê© ¥Å



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ÂÅÃÑÎÁ

/HJHQG

&&$ 6WXG\ $UHD /DQG 8VH =RQLQJV :LFNOR

5DLOZD\ 1HWZRUN &HQWUHOLQH $*+%

▬ 5LJKW RI :D\

3ODQQLQJ $SSOLFDWLRQV :LFNORZ &RXQW\ &RXQFLO

● *UDQWHG

○ 5HIXVHG

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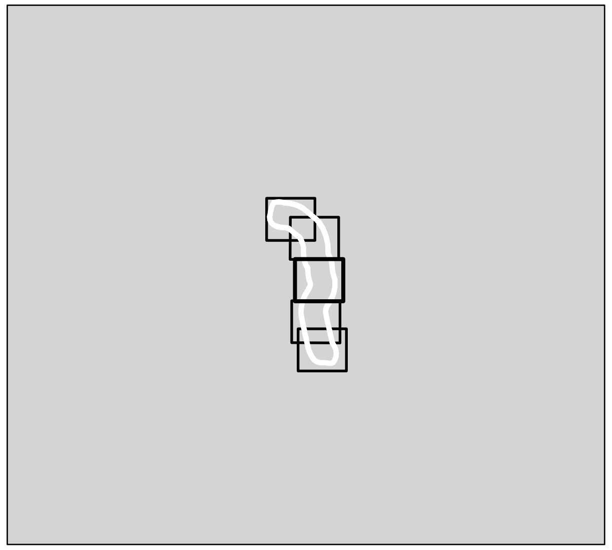
'+/*+)RUHVKRUH 2IIVKRUH 5HQHZDEOH (QHUJ\ 'DWD

▨ 'HWHUPLQDWLRQ

5HIHUHQFH IRU '+/*+

$:LQG
% :DYH
& 7LGDO
' &RPELQDWLRQ



Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		Ìëèæåéê åÜ èÛìßéßåä	Àè×í	¿ÞÛÙ	áÎ	Úæ½ææè Ú

¿âßÛäê

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ÉÛèèßåä Äåëé Û ÉÛèèßåä ÎÚ Àë Øâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ùåã

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$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ ÐßêâÛ

ÂßÝëèÛ
¿¿½"Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×äÚ
¦Ì×ÝÛ åÜ "§

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

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¿âßÛäê Êå	% &		
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õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ ÈßãßêÛÚ
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íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ×
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Ì×êÞ ©©ÝØâåå ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥ÁäìßèåäãÛäê×â¥¿åäéêè×ßäêé¥ÎÛæåèê© ¥Å

ÂÅÃÑÎÁ

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&&$ 6WXG\ $UHD | /DQG 8VH =RQLQJV :LFNOR

⟶ 5DLOZD\ 1HWZRUN &HQWUHOLQH | $'| %'| &'

■ 5LJKW RI :D\ | $3

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○ 5HIXVHG

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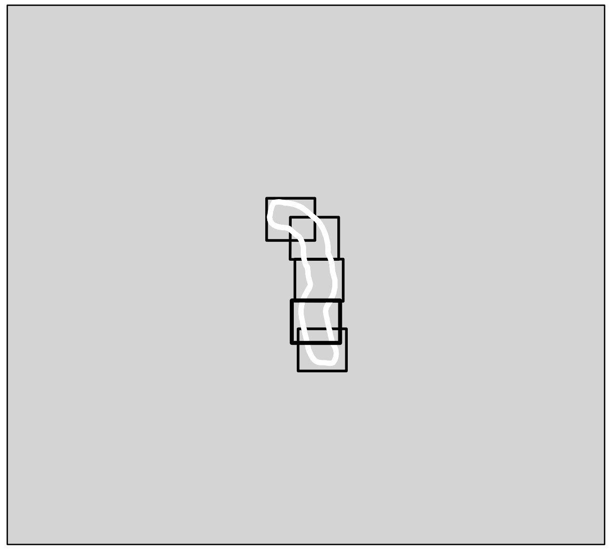
▨ 'HWHUPLQDWLRQ

5HIHUHQFH IRU '+/*+

$:LQG
% :DYH
& 7LGDO
' &RPELQDWLRQ



Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		Ìëèæåéû åÜ èÛìßéßåä	Àè×í	¿ÞÛÙ	áÎÛì	Ú½ææè Ú

¿âßÛäê

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ÉÛèèßåä ÄåëéÛ ÉÛèèßåä ÎÚ ÀëØâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ùåã

Ìèåàâ×êé

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ Ðßêâû

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¿¿½"Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×äÚ
¦Ì×ÝÛ ! åÜ "§

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

Ïê×êÛ ¿åÚÛ	ÌÞ×éÛ		
ÏÙ×âÛ Ž ½	"	ÀË ÊËÐ Ï¿½ÈÁ	
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õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ ÈßãßêÛÚ
Ùåäê×ßäÛÚ ßä êÞßé ÚåÙëãÛäê ×èÛ êÞÛ æèåæÛèêï åÜ Æ×ÙåØé
íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ×
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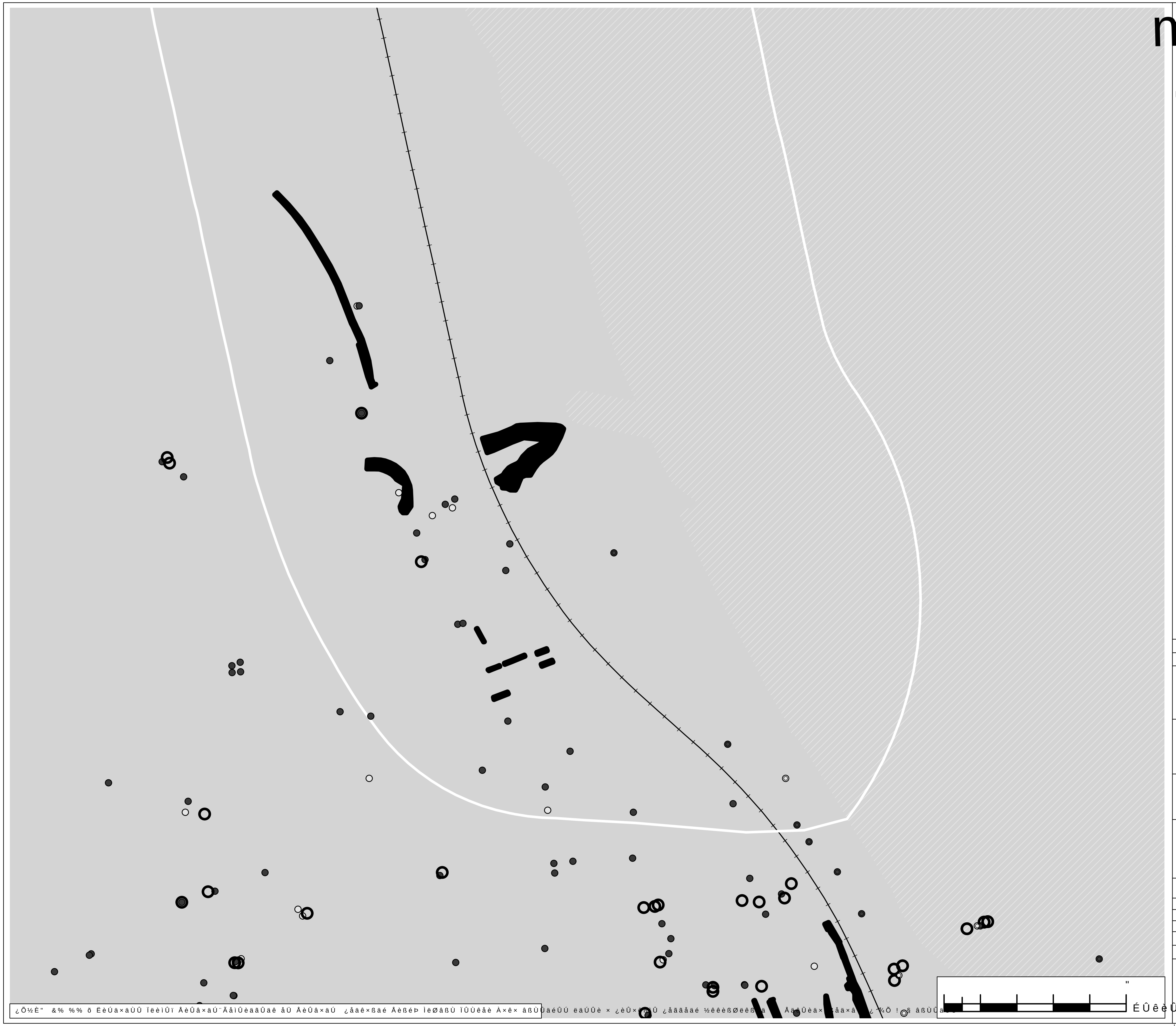
Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßééëÛÚ ßä ×ÙÙåèÚ
ØÛêíÛÛä Æ×ÙåØé ×äÚ êÞÛ ¿âßÛäê Æ×ÙåØé ×ÙÙÛæêé äå âß×Ø
èÛéæåäÛÙê åÜ ×äï ëéÛ åÜ åè èÛâß×äÙÛ ëæåä êÞßé Úè×íßäÝ Øï
Ì×êÞ ©©ÝØâåä ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥Áäìßèåää ãÛäê×â¥¿åäéêè×ßäêé¥ÎÛæåèê©



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ÂÅÃÑÎÁ

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&&$ 6WXG\ $UHD

/DQG 8VH =RQLQJV :LFNOR

5DLOZD\ 1HWZRUN &HQWUHOLQH

5LJKW RI :D\

3ODQQLQJ $SSOLFDWLRQV
&RXQW\ &RXQFLO

● *UDQWHG

○ 5HIXVHG

○ /LYH

$Q %RUG 3OHDQDOD &DVHV

▨ 6WUDWHJLF +RXVLQJ 'HYHORSPHQW

'+/*+)RUHVKRUH 2IIVKRUH
5HQHZDEOH (QHUJ\ 'DWD

▨ 'HWHUPLQDWLRQ

&RQVXOWDWLRQ

$*%

$26 $FWLYH 2SHQ 6SD

$3LFNORZ

&(&RPPXQLW\ (GXFD

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5 1HZ 5HVLGHQWLDO
KD

5(([LVWLQJ 5HVLGHQ

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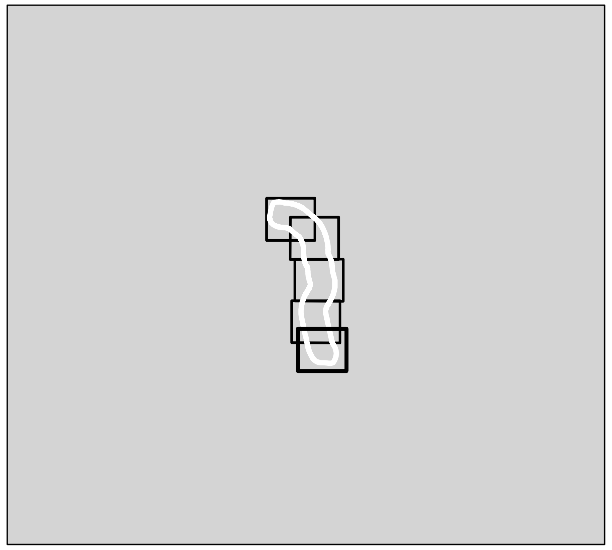
7& 7RZQ &HQWUH

5HIHUHQFH IRU '+/*+

$:LQG
% :DYH
& 7LGDO
' &RPELQDWLRQ



Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		Ìëèæåé Û åÜ èÛìßéßåä	Àè×í	¿ÞÛÙ	áÎ Ì	Ú½ææè Ú

¿âßÛäê

ÀÛéßÝäÛè

ÉÛèèßåä ÄåëéÛ ÉÛèèßåä ÎÚ ÀëØâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ùåã

Ìèå àÛÙê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ ÐßêâÛ

ÂßÝëèÛ
¿¿½"Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×äÚ
¦Ì×ÝÛ " åÜ "§

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

Ïê×êÛ ¿åÚÛ	ÌÞ×éÛ	
ÏÙ×âÛ Ž ½	"	ÀË ÊËÐ Ï¿½ÈÁ
Æ×ÙåØé Êå	À #"%	ÎÛì Ò
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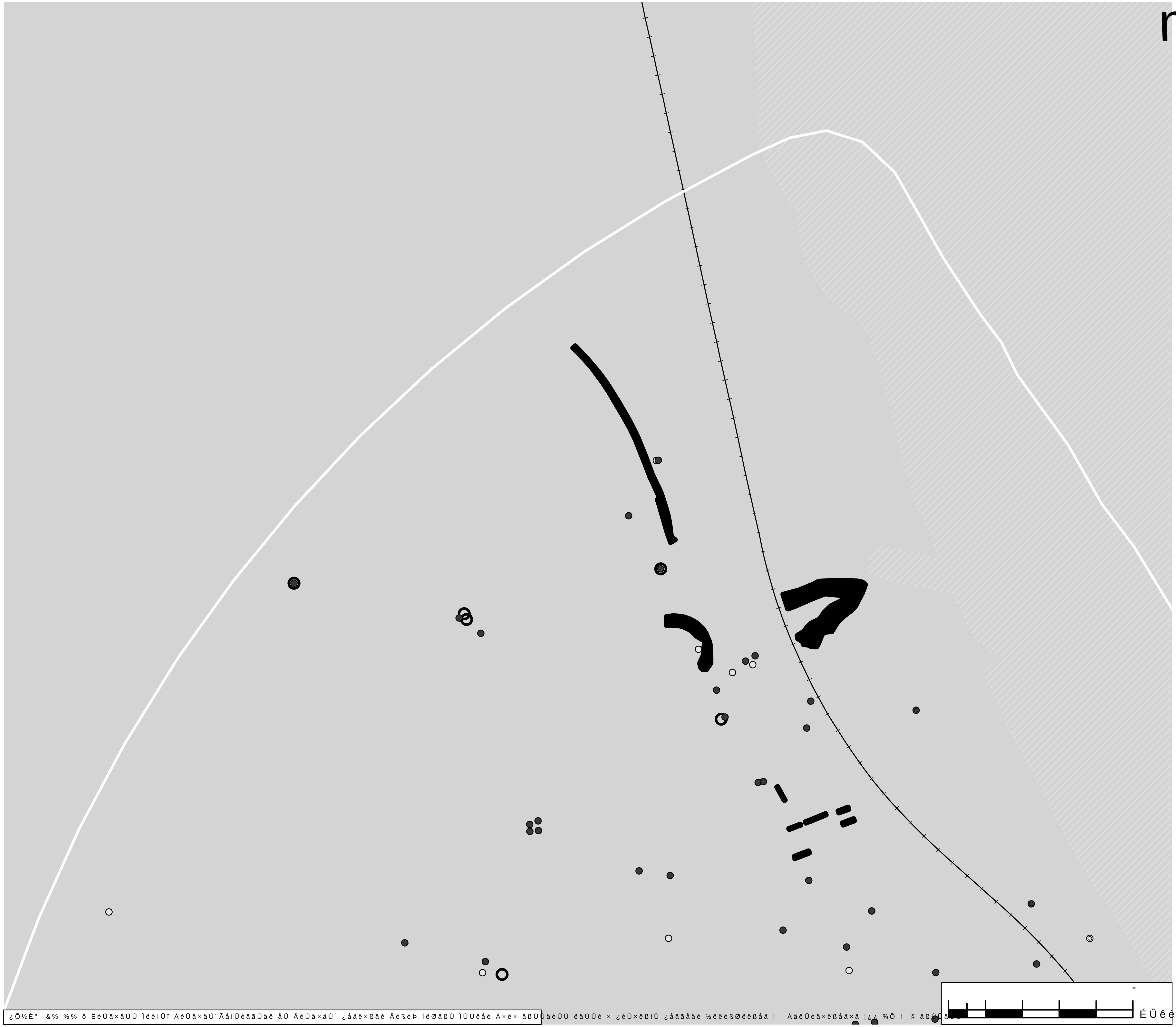
Àè×íßäÝ Êå	&&$ 3 ':* (9 -$&	

õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ ÈßãßêÛÚ
ÙåäêßäÛÚ ßä êÞßé ÚåÙëãÛäê ×èÛ êÞÛ æèåæÛèêï åÜ Æ×ÙåØé
íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ×
ÙåæïèßÝÞê ÈßãßêÛÚ ÐÞßé Úè×íßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ
Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßééëÛÚ ßä ×ÙÙåèÚ
ØÛêíÛÛä Æ×ÙåØé ×äÚ êÞÛ ¿âßÛäê Æ×ÙåØé ×ÙÙÛæêé äå â
èÛéæÛÙê åÜ ×äï ëéÛ åÜ åè èÛâß×äÙÛ ëæåä êÞßé Úè×íßäÝ Øï

Ì×êÞ ©©ÝØâåä ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌ©½èÙÃÅÏ© &¥ÁäìßèåäãÛäê×â¥¿åäéÛè×êßåä



ÂÅÃÑÎÁ

/HJHQG

&&$ 6WXG\ $UHD /DQG 8VH =RQLQJ :LFNOR

5DLOZD\ 1HWZRUN &HQWUHOLQH

5LJKW RI :D\

$26 $FWLYH 2SHQ 6SD

3ODQQLQJ $SSOLFDWLRQV &RXQW\ &RXQFLO

$3 :LFNORZ

● *UDQWHG

&(&RPPXQLW\ (GXFD

○ 5HIXVHG

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◯ /LYH

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$Q %RUG 3OHDQDOD &DVHV

26 2SHQ 6SDFH

▨ 6WUDWHJLF +RXVLQJ 'HYHORSPHQW

5 1HZ 5HVLGHQWLDO

'+/*+)RUHVKRUH 2IIVKRUH 5HQHZDEOH (QHUJ\ 'DWD

5(([LVWLQJ 5HVLGHQ

'HWHUPLQDWLRQ

&RQVXOWDWLRQ

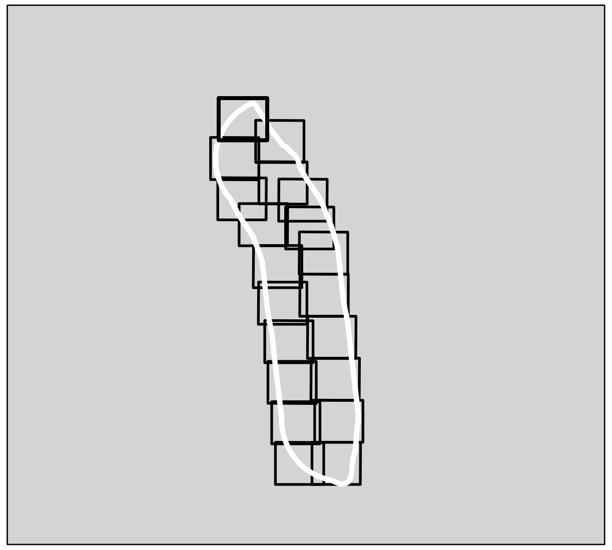
5HIHUHQFH IRU '+/*+

$:LQG

% :DYH

& 7LGDO

' &RPELQDWLRQ



Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		ÌëèæåéÛ åÜ èÛìßéßåä	Àè×í	ä¿ÞÛÙ	áÎŴì	Ú½ææè Ú

¿âßÛäê

ÀÛéßÝäÛè

ÉÛèèßåä ÄåëéÛ ÉÛèèßåä ÎÚ ÀëØâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ùåã

ÌèåàÛÙê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ Ðßêâ Û

ÂßÝëèÛ
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¦Ì×ÝÛ åÜ §

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

Ïê×êÛ ¿åÚÛ	ÌÞ×éÛ
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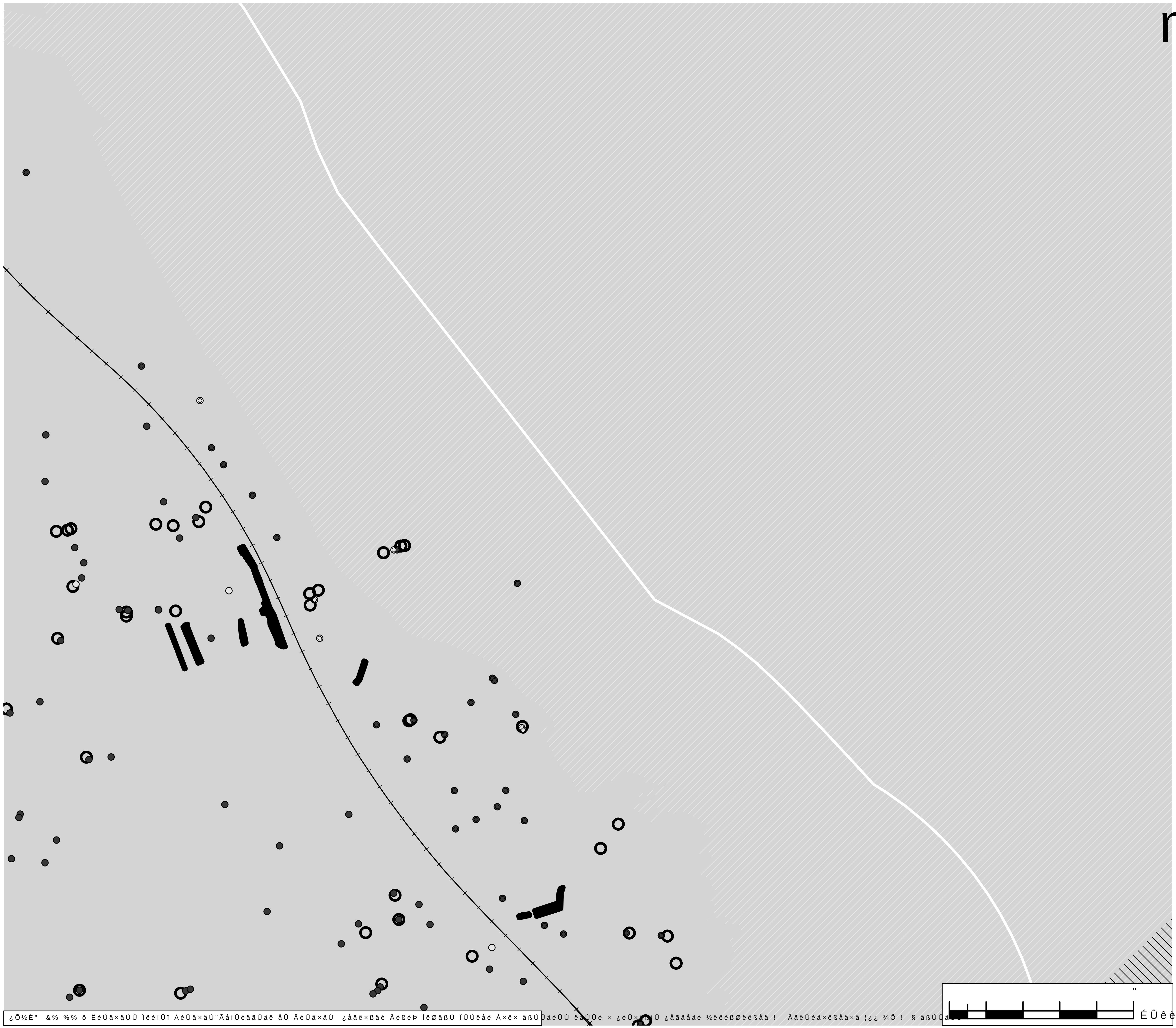
ÀË ÊËÐ ÏÇ¿½ÈÁ

ÎÛì Ò

õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ ÈßãßêÛÚ Ùåäê×ßäÛÚ ßä êÞßé ÚåÙëãÛäê ×èÛ êÞÛ æèåæÛèêï åÜ Æ×ÙåØé íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ× ÙåæïèßÝÞê Èßãßê×êßåä ÐÞßé Úè×íßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßééëÛÚ ßä ×ÙÙåèÚ ØÛêíÛÛä Æ×ÙåØé ×äÚ êÞÛ ¿âßÛäê Æ×ÙåØé ×ÙÙÛæêé äå âß×Ø èÛéæåäÙÛ åÜ ×äï ëéÛ åÜ åè èÛâß×äÙÛ ëæåä êÞßé Úè×íßäÝ Øï

Ì×êÞ ©©ÝØâåå ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥ÁäìßèåääÛäê×â¥¿åäéêè×ßäêé¥ÎÛæåèê©



¿Õ½È" &% %% õ ËèÚä×äÙÛ ÏëèÌÛï ÅèÛâ×äÚ¨ÃåÌÛèäãÛäê åÜ ÅèÛâ×äÚ ¿åäê×ßäé Åèßéþ ÌëØâßÙ ÏÛÙêåè À×ê× âßÙÛäéÛÚ ëäÚÛè × ¿èÛ×êßÙÛ ¿åããåäé ½êêèßØëêßåä ! ÅäêÛèä×êßåä×â ¦¿¿ ¾Õ ! § âßÙÛäéÛ

ÂÅÃÑÎÁ

/HJHQG

	&&$ 6WXG\ $UHD /DQG 8VH =RQLQJV :LFNOR	$26	$UHD RI 2XWVWDQGLQJ 1DWXUDO %HDXW\
⊣⊢	5DLOZD\ 1HWZRUN &HQWUHOLQH	26	2SHQ 6SDFH
■	5LJKW RI :D\	$3	

3ODQQLQJ $SSOLFDWLRQV &RXQW\ &RXQFLO

- ● *UDQWHG
- ○ 5HIXVHG
- ◯ /LYH

'+/*+)RUHVKRUH 2IIVKRUH 5HQHZDEOH (QHUJ\ 'DWD

- ▨ $SSOLHG
- ▨ 'HWHUPLQDWLRQ
- &RQVXOWDWLRQ

&(LFNORZ &RPPXQLW\ (GXFD

2SHQ 6SDFH

5(([LVWLQJ 5HVLGHQ

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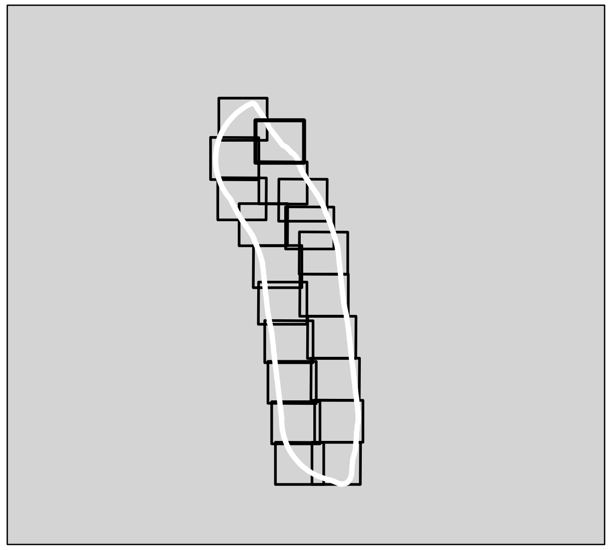
7& 7RZQ &HQWUH

5HIHUHQFH IRU '+/*+

$:LQG
% :DYH
& 7LGDO
' &RPELQDWLRQ



Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		Ìëèæåéû åÜ èÛìßéßåä	Àè×í	ä¿ÞÛÙ	áÎÏì	Ú½ææè Ú

¿âßÛäê

ÀÛéßÝäÛè

ÉÛèèßåä ÄåëéÛ ÉÛèèßåä ÎÚ ÀëØâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ùåã

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$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ Ðßêâ

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¿¿½# Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×ä
¦Ì×ÝÛ åÜ §

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

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íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ×
ÙåæïèßÝÞê ÈßãßêÛÚ ÐÞßé Úè×íßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ
Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßééëÛÚ ßä ×ÙÙåèÚ
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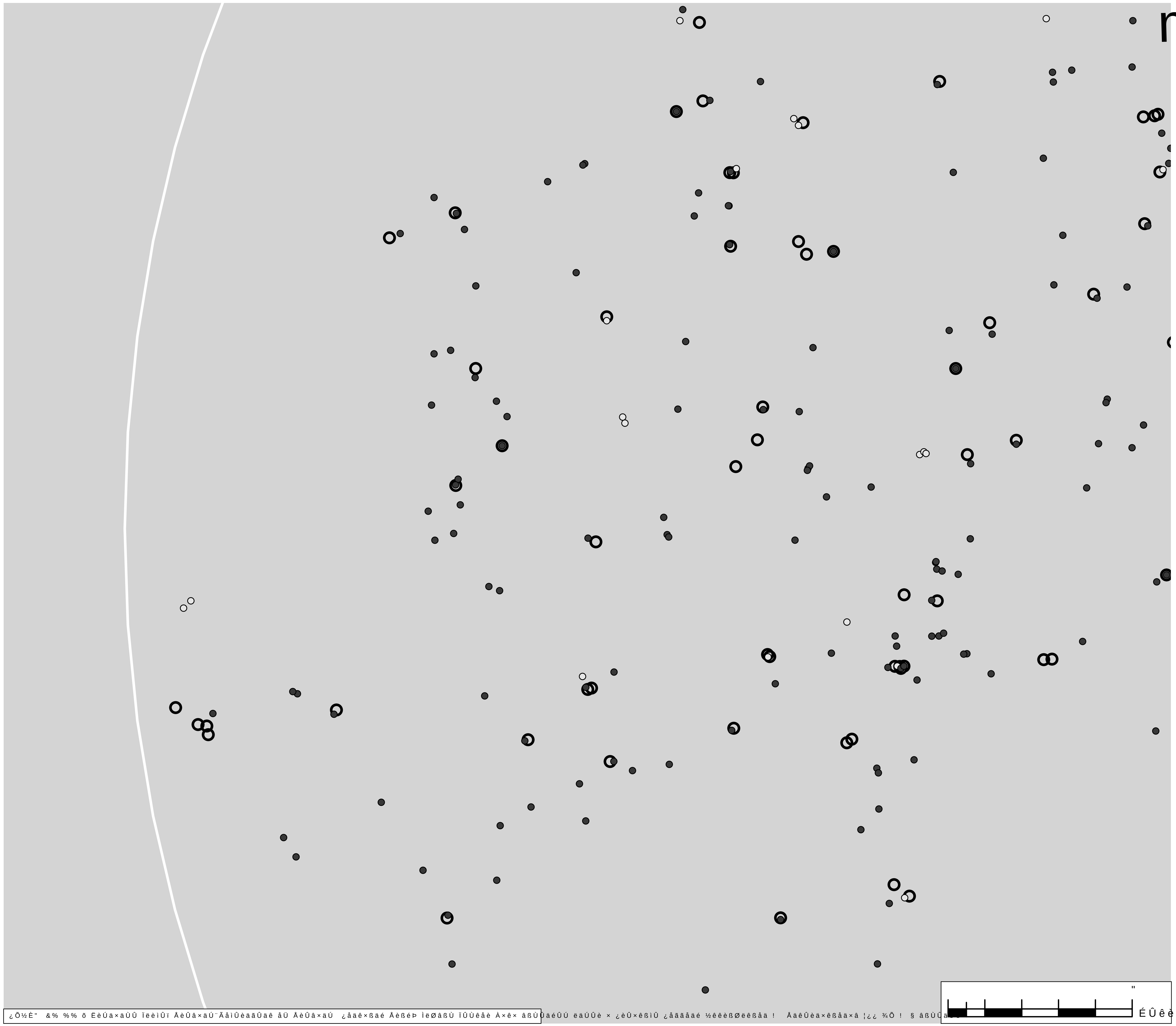
Ì×êÞ ©©ÝØâåå ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌ©½èÙÃÅÏ© &¥ÁäìßèåäãÛäê×â¥¿åäéê×ßäêé¥ÎÛæåèê©



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&RXQW\ &RXQFLO

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○ 5HIXVHG

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$Q %RUG 3OHDQDOD &DVHV

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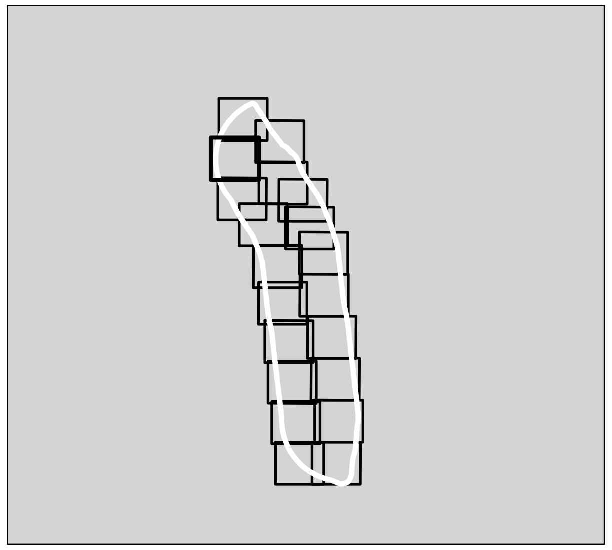

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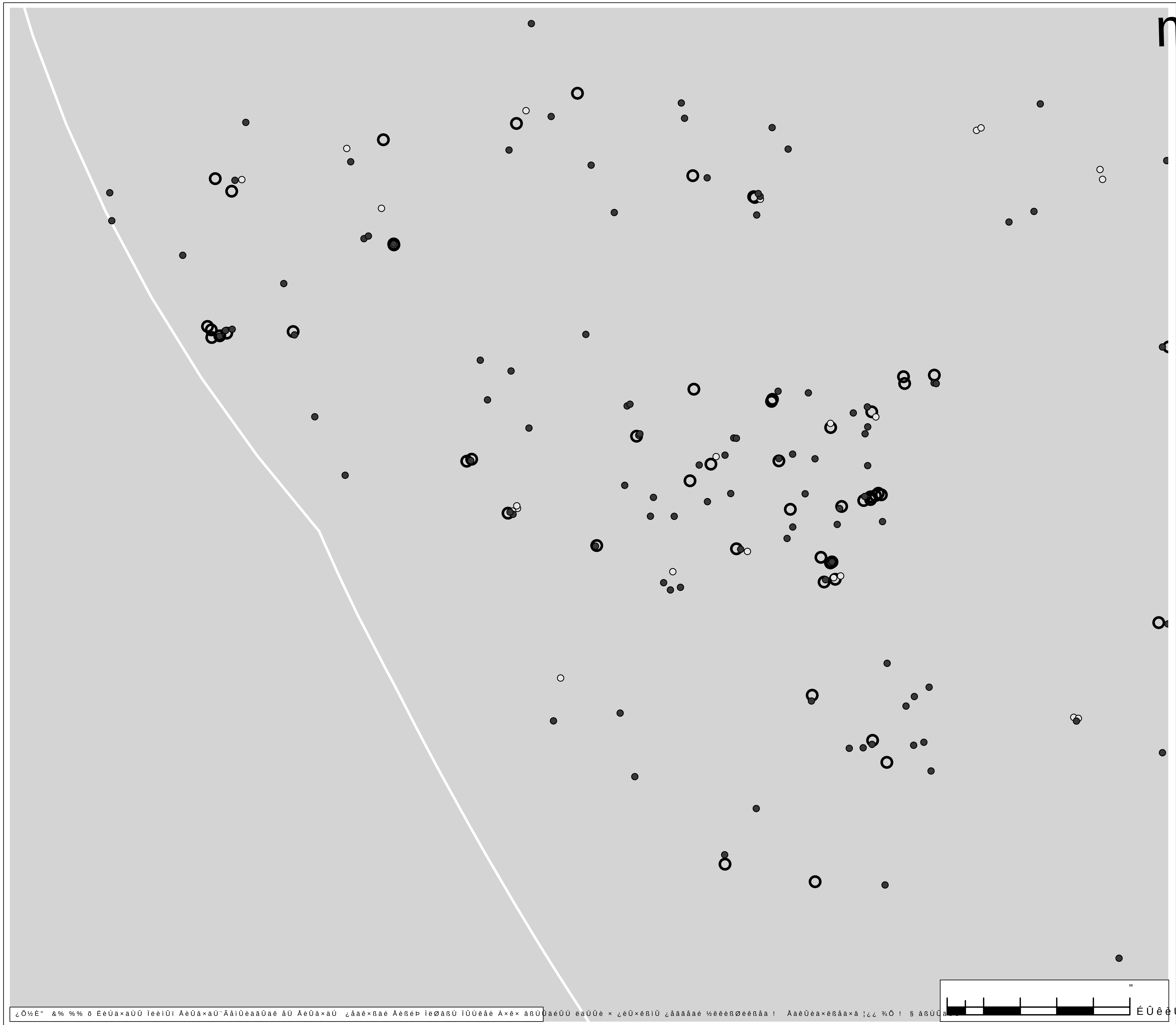

ÂÅÃÑÎÁ

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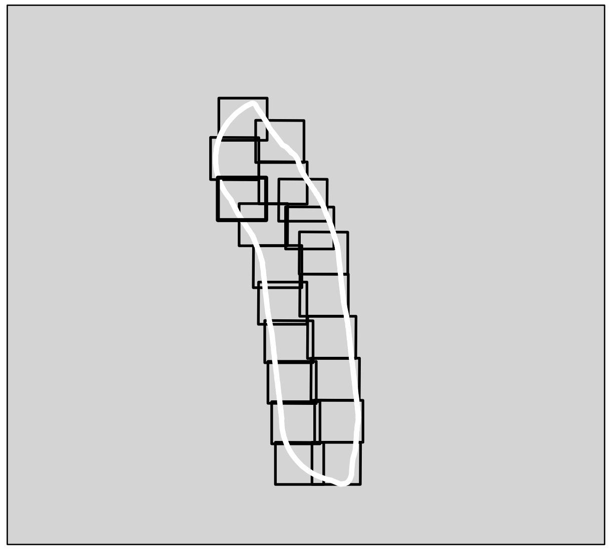

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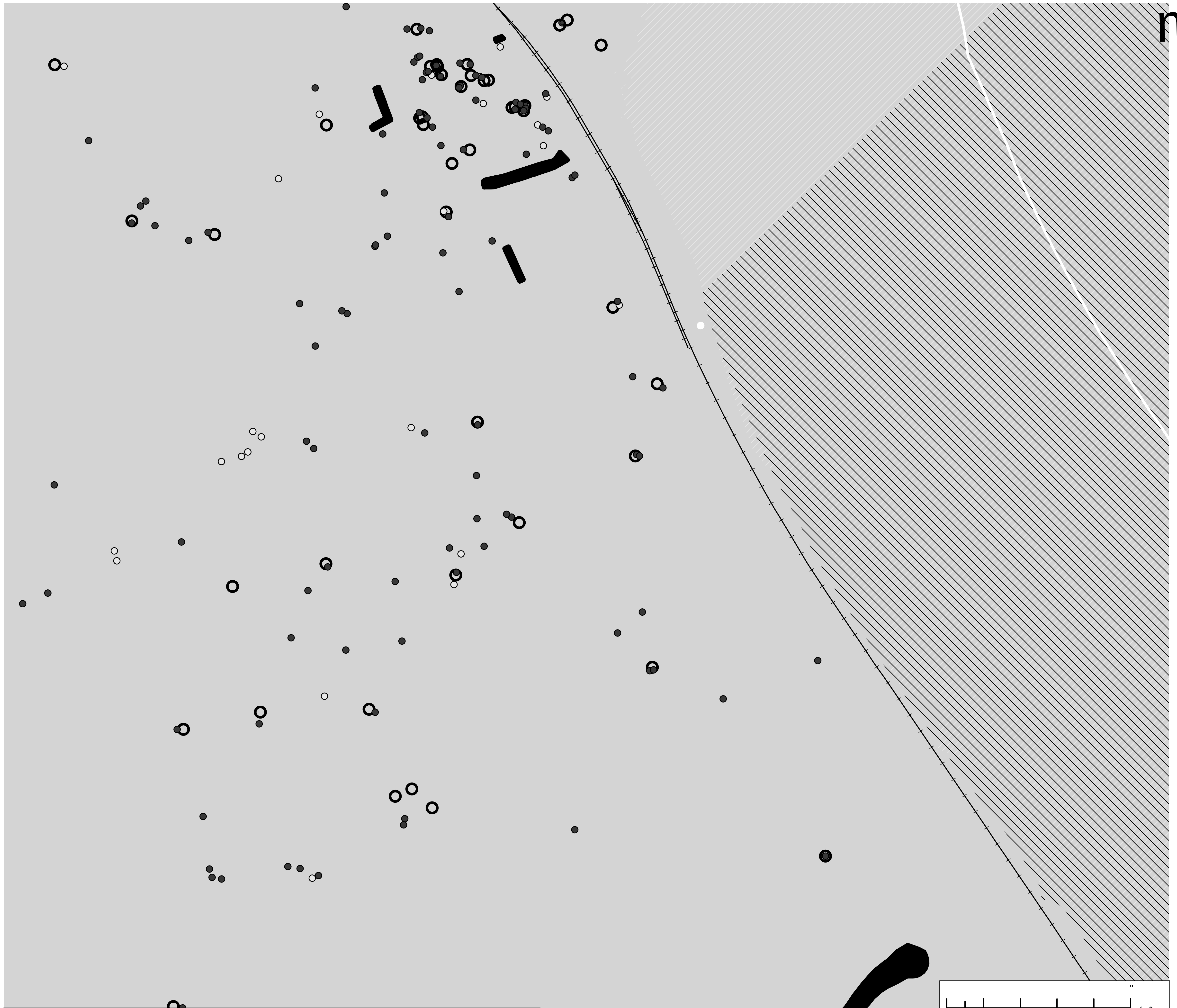

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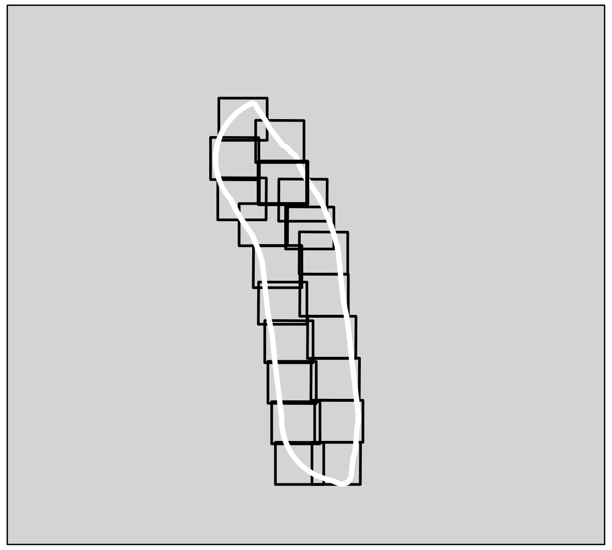

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Ì×êÞ ©©ÝØâåä ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥ÁäìßèåäãÛäê×â¥¿åäéêè×ßäêé¥ÎÛæåèêé©

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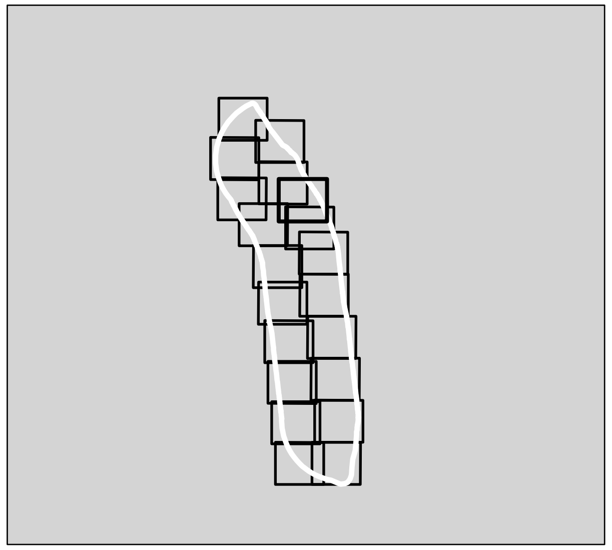

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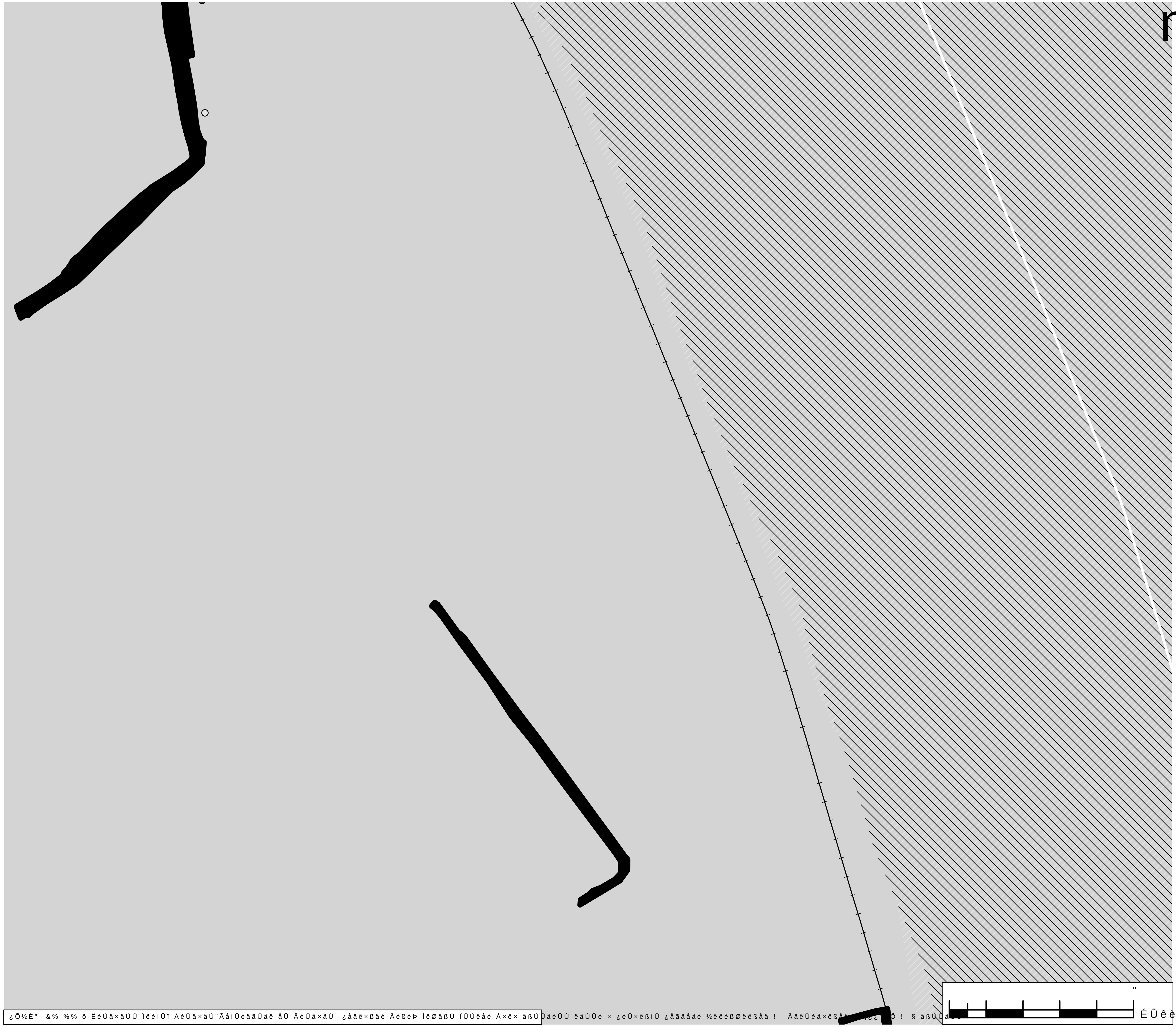

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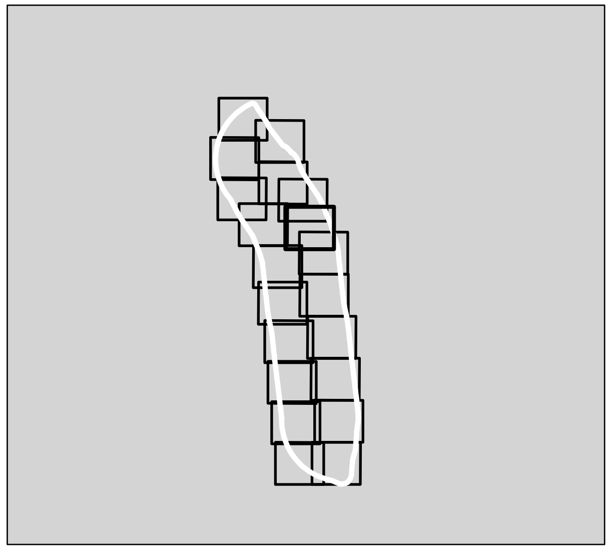

Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
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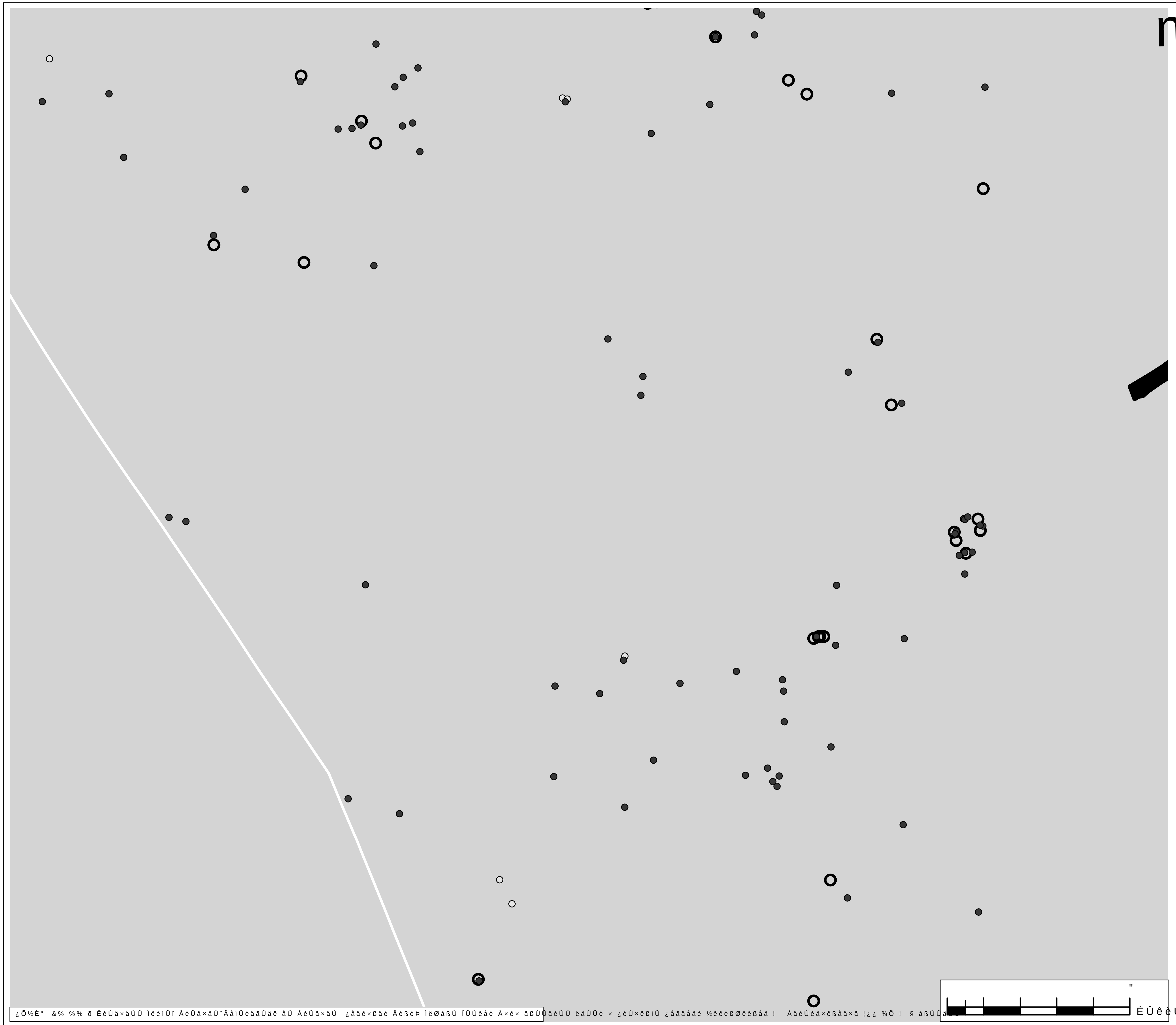
Ì×êÞ ©©ÝØâåå ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥ÁäìßèåäãÛäê×â¥¿åäéêè×ßäêé¥ÎÛæåèêé© ¥Å



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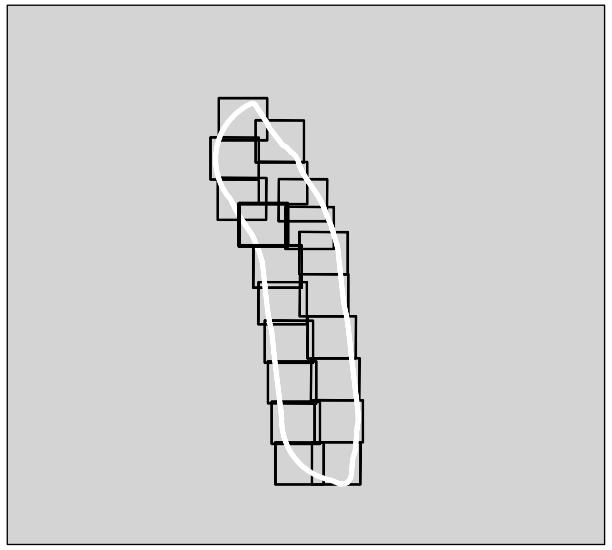

Ò	É×è	! ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
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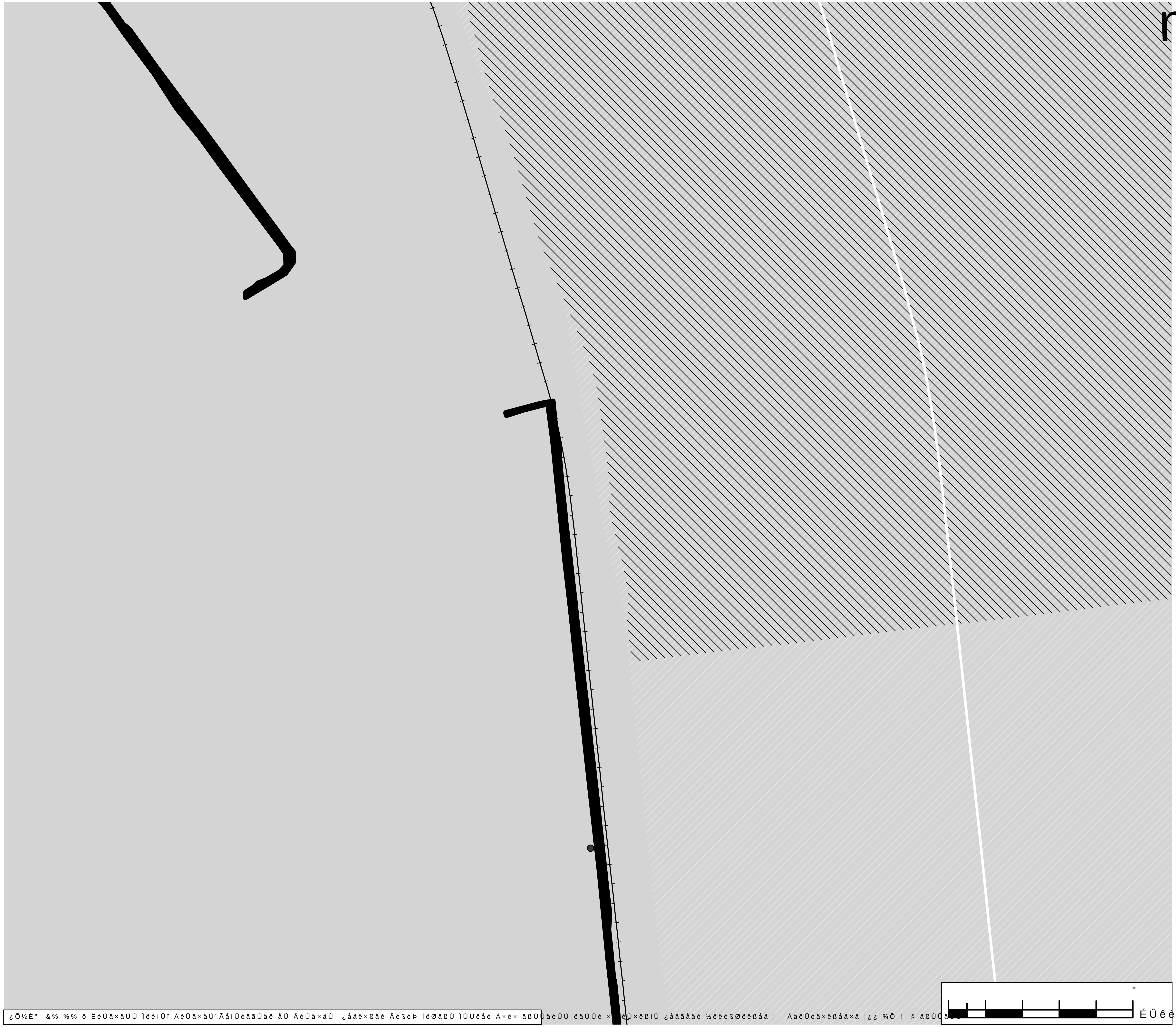
Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßééëÛÚ ßä ×ÙÙåèÚ
ØÛêíÛÛä Æ×ÙåØé ×äÚ êÞÛ ¿âßÛäê Æ×ÙåØé ×ÙÙÛæêé äå âß×Ø
èÛéæÛÙê åÜ ×äï ëéÛ åÜ åè èÛâß×äÙÛ ëæåä êÞßé ÚèßíßäÝ Øï

Ì×êÞ ©©ÝØâåä ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌ©½èÙÃÅÏ© &¥ÁäìßèåäãÛäê×â¥¿åäéê×äêé¥ÎÛæåèê©



m

ÂÅÃÑÎÁ

/HJHQG

&&$ 6WXG\ $UHD /DQG 8VH =RQLQJV :LFNOR

5DLOZD\ 1HWZRUN &HQWUH/LQH $*%%'% $UHD 6%

5LJKW RI :D\ $26 $FWLYH 2SHQ 6SD

3ODQQLQJ $SSOLFDWLRQV 7:LFNOR 7RZQ 7RZ &RXQW\ &RXQFLO

● *UDQWHG

'+/*+)RUHVKRUH 2IIVKRUH 5HQHZDEOH (QHUJ\ 'DWD

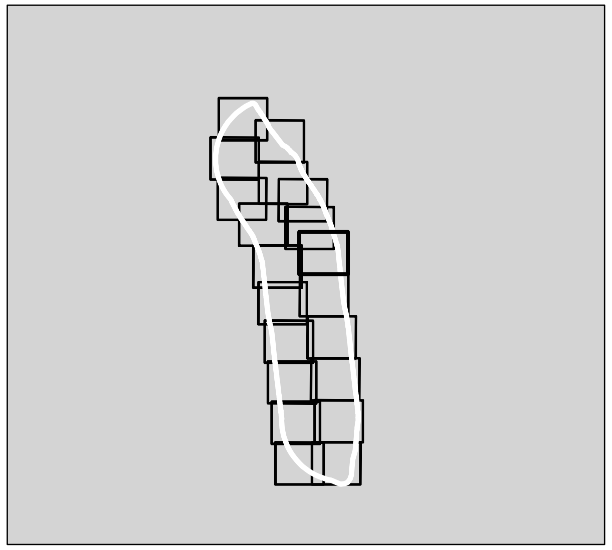
▨ $SSOLHG

▨ 'HWHUPLQDWLRQ

&RQVXOWDWLRQ

5HIHUHQFH IRU '+/*+

$:LQG
% :DYH
& 7LGDO
' &RPELQDWLRQ



Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		ìëèæåéÛ åÜ èÛìßéßåä	Àè×í	ä¿ÞÛÙ	áÎŴì	Ú½ææè Ú

¿âßÛäê

ÀÛéßÝäÛè

ÉÛèèßåä ÄåëéÛ ÉÛèèßåä ÎÚ ÀëØâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ùåã

ÌèåàÛÙê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ Ðßêâ

ÂßÝëèÛ
¿¿½# Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×ä
¦Ì×ÝÛ & åÜ §

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

ÏêÛ×êÛ ¿åÚÛ ÌÞ×éÛ

ÏÙ×âÛ Ž ½ "

Æ×ÙåØé Êå À #"%

¿âßÛäê Êå % &

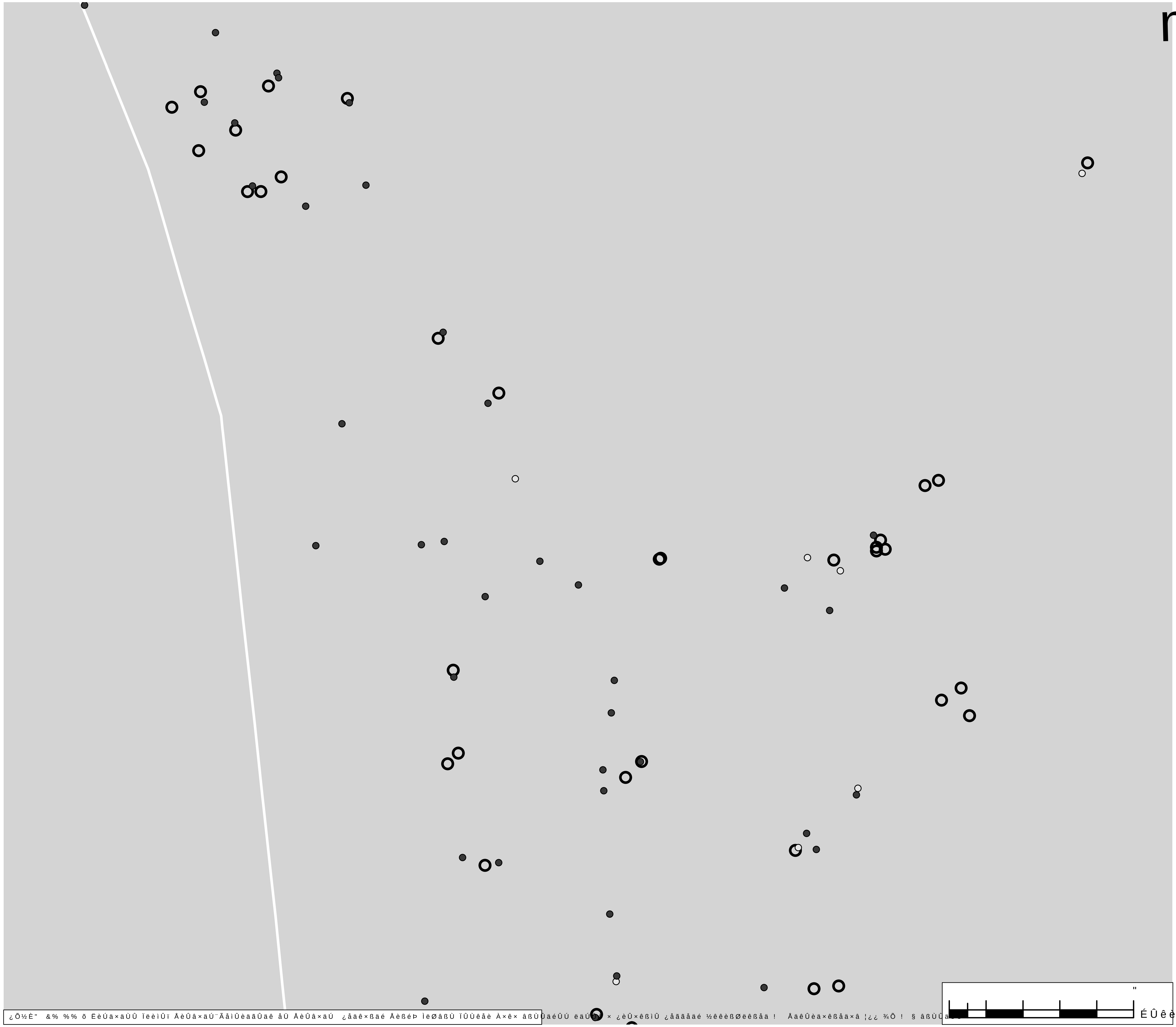
Àè×íßäÝ Êå &&$ B 3 ':* (9 -$&

ÀË ÊËÐ ÏÅ¿½ÈÁ

ÎÛì Ò

õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ Èßãßên ÙåäêÛäêé ßä êÞßé ÚåÙëãÛäêé ×èÛ êÞÛ æèåæÛèêï åÜ Æ×ÙåØé íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ× ÙåæïèßÝÞê ÈßãßêÛÚ ÐÞßé ÚèÚíßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßééëÛÚ ßä ×ÙÙåèÚ ØÛêíÛÛä Æ×ÙåØé ×äÚ êÞÛ ¿âßÛäê Æ×ÙåØé ×ÙÙÛæêé äå âß×Ø èÛéæÛÙê åÜ ×äï ëéÛ åÜ åè èÛâß×äÙÛ ëæåä êÞßé ÚèÚíßäÝ Øï

Ì×êÞ ©©ÝØâåä ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥ÁäìßèåäãÛäê×â¥¿åäéêè×ßäêé¥ÎÛæåèê© ¥Å



¿Õ½Ë" &% %% õ ËèÛä×äÙÛ ÏëèìÛÏ ÅèÛâ×äÙ¨ÃåìÛèäãÛäê åÜ ÅèÛâ×äÙ ¿åäê×ßäé Åëèéä×äÙ ÏëØâßÙ ÎÛÛéåè Á×ê× åßÙÛäéÛÛÙ ëäÙÛè ×¿åäê×ßäé ½ÛèêßØß ¿×äêåäÛäé ½ÛèêßØßÛ! ÅäêÛèä×êßåä×â ¦¿¿ ¾Õ ! § åßÙÛäÙÛ

ÂÅÃÑÎÁ

/HJHQG

&&$ 6WXG\ $UHD /DQG 8VH =RQLQJV :LFNOR

3ODQQLQJ $SSOLFDWLRQV &RXQW\ &RXQFLO

- ● *UDQWHG
- ○ 5HIXVHG
- ○ /LYH

$:LFNORZ $*%

$26 $FWLYH 2SHQ 6SD

&(&RPPXQLW\ (GXFD

08 0L[HG 8VH

26 2SHQ 6SDFH

5 5HVLGHQWLDO X

5 1HZ 5HVLGHQWLDO KD

5(([LVWLQJ 5HVLGHQ

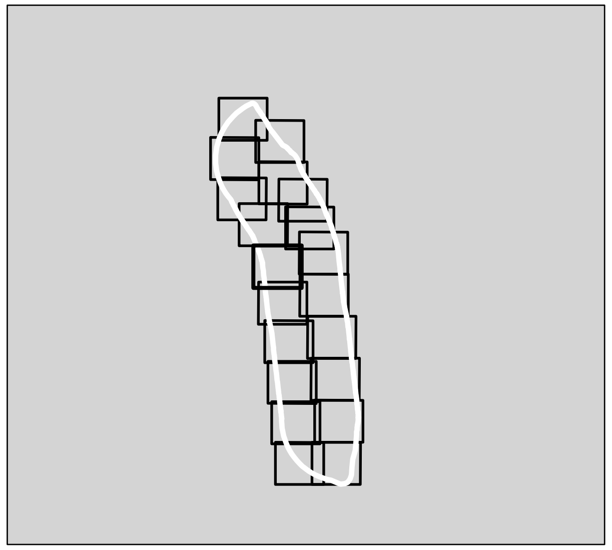
6/% 6WUDWHJLF /DQG

7 7RXULVP

7& 7RZQ &HQWUH

5HIHUHQFH IRU '+/*+

$:LQG
% :DYH
& 7LGDO
' &RPELQDWLRQ



Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		Ìëèæåé åÜ èÛìßéßåä	Àè×í	¿ÞÛÙ	áÎ	Ú½ææè Ú

¿âßÛäê

ÀÛéßÝäÛè

ÉÛèèßåä ÄåëéÛ ÉÛèèßåä ÎÚ ÀëØâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ùåã

ÌèåàÛÙê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ Ðßêâ

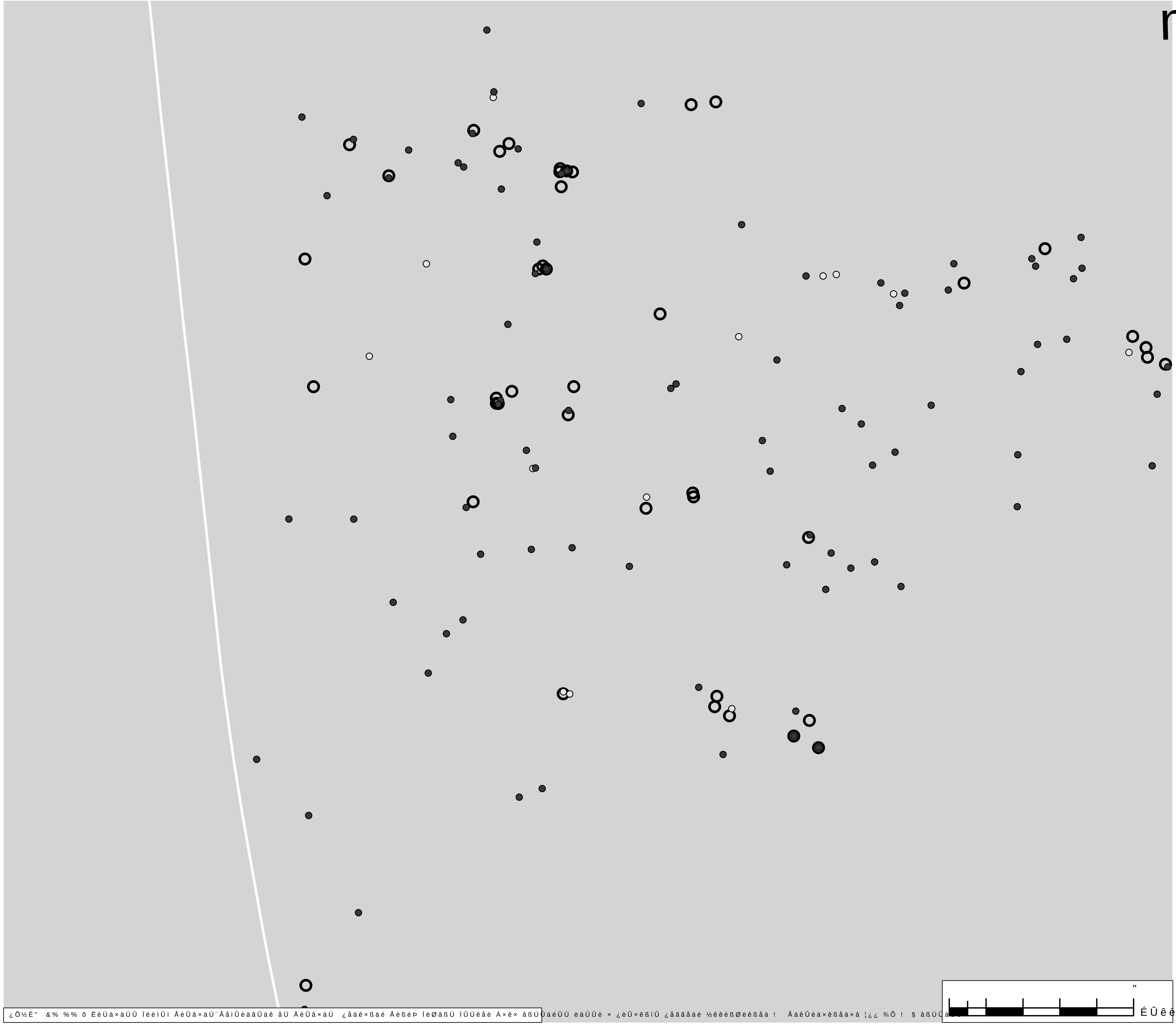
ÂßÝëèÛ
¿¿½# Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×ä
¦Ì×ÝÛ åÜ §

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

Ïê×êÛ ¿åÚÛ	ÌÞ×éÛ	
ÏÙ×âÛ Ž ½	"	ÀË ÊËÐ Ï¿½ÈÁ
Æ×ÙåØé Êå À #"%		ÎÛì Ò
¿âßÛäê Êå % &		
Àè×íßäÝ Êå	&&$ B 3 ':* (9 -$&	

õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ Èßãßê ÛÚ ÙåäêÛäê ßä êÞßé ÚåÙëãÛäê ×èÛ êÞÛ æèåæÛèêï åÜ Æ×ÙåØé íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ× ÙåæïèßÝÞê ÈßãßêÛÚ ÐÞßé Úè×íßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßéééëÛÚ ßä ×ÙÙåèÚ ØÛêíÛÛä Æ×ÙåØé ×äÚ êÞÛ ¿âßÛäê Æ×ÙåØé ×ÙÙÛæêé äå âß×Ø èÛéæÛÙê åÜ ×äï ëéÛ åÜ åè èÛâß×äÙÛ ëæåä êÞßé Úè×íßäÝ Øï

Ì×êÞ ©©ÝØâåå ìé ©ÃÅÏÌèåàÛ©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥ÁäìßèåäãÛäê×â¥¿åäéêè×ßäêé¥ÎÛæåèê



¿Õ½È" &% %% õ ËèÚâ×äÙÛ Ïëèìîûï ÅèÛâ×äÚ¨ÃåìÛèäãÛäê åÜ ÅèÛâ×äÚ ¿åäê×ßäé Åèßéþ ÌëØâßÙ ÏÛÙêåè À×ê× âßÙÛäéÛÚ ëäÚÛè × ¿èÛ×êßìÛ ¿åããåäé ½êêèßØëêßåä ! ÅäêÛè×êßåä×â ¦¿¿ ¾Õ ! § âßÙÛäéÛ

m

ÂÅÃÑÎÁ

/HJHQG

&&$ 6WXG\ $UHD /DQG 8VH =RQLQJV :LFNOR

3ODQQLQJ $SSOLFDWLRQV $2LFNORZ &RXQW\ &RXQFLO

● *UDQWHG

○ 5HIXVHG

O /LYH

$26 6RUWLYH 2SHQ 6SDF

&(&RPPXQLW\ (GXFD

((PSOR\PHQW

26 2SHQ 6SDFH

38 3XEOLF 8WLOLW\

5 5HVLGHQWLDO X

5 1HZ 5HVLGHQWLDO
KD

5(([LVLWLQJ 5HVLGHQ

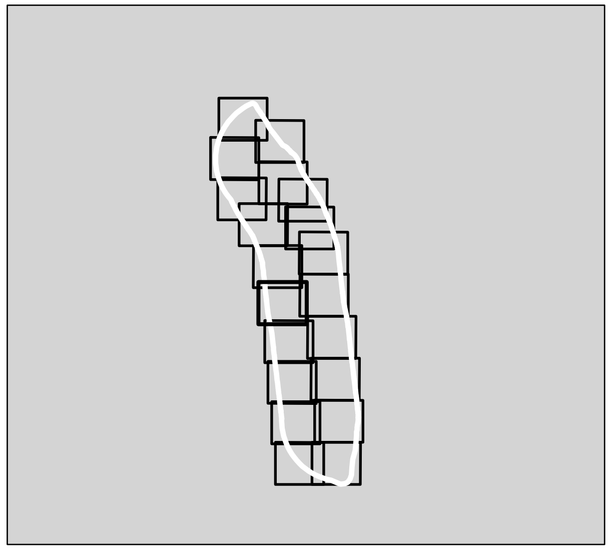
6/% 6WUDWHJLF /DQG

7 7RXULVP

7& 7RZQ &HQWUH

5HIHUHQFH IRU '+/*+

$:LQG
% :DYH
& 7LGDO
' &RPELQDWLRQ



Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		Ìëèæåéû åÜ èÛìßéßåä	Àè×íä	¿ÞÛÙ	áÎÏì	Ú½ææè Ú

¿âßÛäê

ÀÛéßÝäÛè

ÉÛèèßåä ÄåëéÛ ÉÛèèßåä ÎÚ ÀëØâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ùåã

ÌèåàÛÙê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ ÐßêâÛ

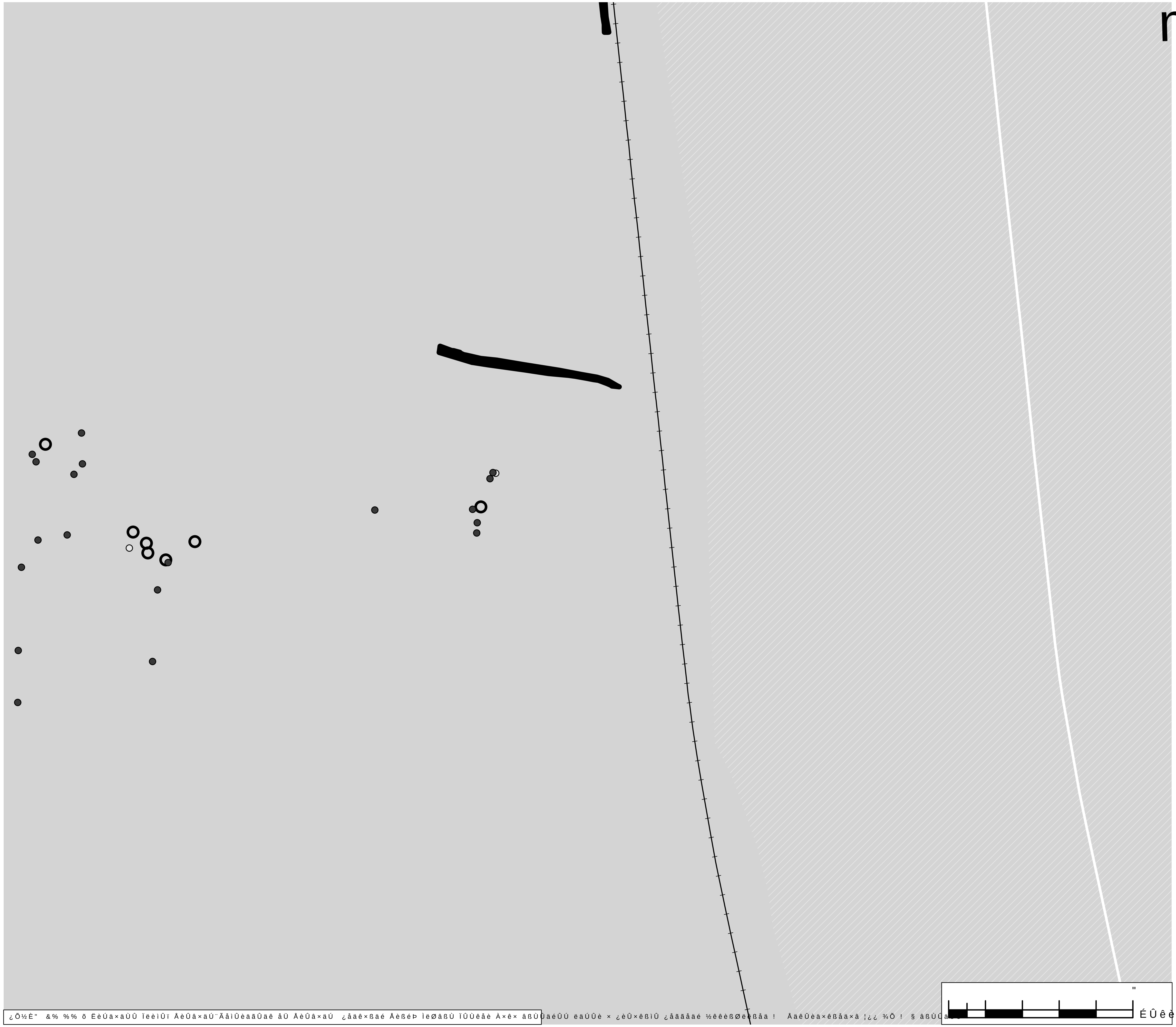
ÂßÝëèÛ
¿¿½# Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×ä
¦Ì×ÝÛ åÜ §

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

Ïê×êÛ ¿åÚÛ	ÌÞ×éÛ	
ÏÙ×âÛ Ž ½	"	ÀË ÊËÐ Ï¿½ÈÁ
Æ×ÙåØé Êå	À #"%	ÎÛì Ò
¿âßÛäê Êå	% &	
Àè×íßäÝ Êå	&&$ B 3 ':* (9 -$&	

õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ Èßãßê
ÙåäêÛäêé åÜ êÞßé ÚåÙëãÛäê ×èÛ êÞÛ æèåæÛèêï åÜ Æ×ÙåØ
íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ×
ÙåæïèßÝÞê ÈßãßÛ×êßåä ÐÞßé Úè×íßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ
Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßééëÛÚ ßä ×ÙÙåè
ØÛêíÛÛä Æ×ÙåØé ×äÚ êÞÛ ¿âßÛäê Æ×ÙåØé ×ÙÙÛæêé äå âß×Ø
èÛéæÛÙê åÜ ×äï ëéÛ åÜ åè èÛâß×äÙÛ ëæåä êÞßé Úè×íßäÝ Øï

Ì×êÞ ©©ÝØâåä ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥Áäìßèåää ÛäêÛ×â¥¿åäéêè×ßäêé¥ÎÛæåèêé© ¥Å



ÂÅÃÑÎÁ

/HJHQG

&&$ 6WXG\ $UHD /DQG 8VH =RQLQJV :LFNOR

5DLOZD\ 1HWZRUN &HQWUHOLQH 5HFRUGHG 0RQXPHQWV

5LJKW RI :D\ 6/% 6WUDWHJLF /DQG

3ODQQLQJ $SSOLFDWLRQV :LFNORZ &RXQW\ &RXQFLO

● *UDQWHG

○ 5HIXVHG

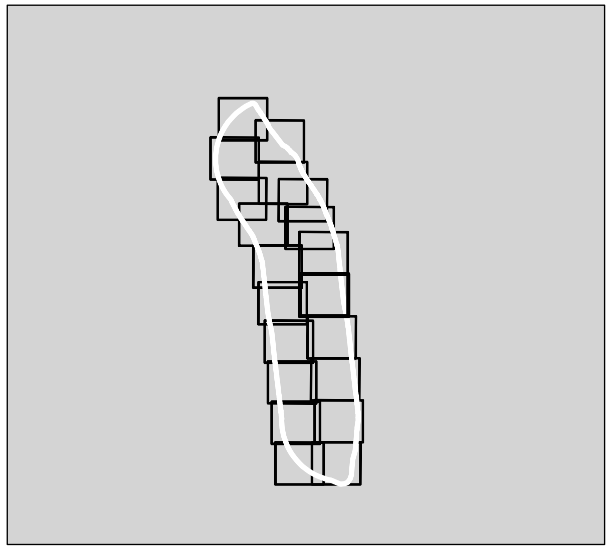
○ /LYH

'+/*+)RUHVKRUH 2IIVKRUH 5HQHZDEOH (QHUJ\ 'DWD

▨ 'HWHUPLQDWLRQ

5HIHUHQFH IRU '+/*+

$:LQG
% :DYH
& 7LGDO
' &RPELQDWLRQ



Ò	É×è	!	ÂËÏ ÏÂÒÂÁÓ	ÉÏ	ÏÏ	ÆÂ	ÂÇ
ÏÛÏ	Â×êÛ		Ïèèæåéâ åÜ èÛïßéßåä	Âè×ïä	¿ÞÛÙáÛâ	Û½æææè Û	

¿åßÛäé

ÀÛéßÝäÛè

ÉÛèèßåä ÅåëéÛ ÉÛèèßåä ÎÛ ÀèØâßä !
ÅèÛâ×äÛ Â ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ûåâ

ÏèåàÛÙê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÂËÊ ÌÎËÆÁ¿

Âè×íßäÝ Ðßêâ

ÂßÝëèÛ
¿¿½# Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×
¦Ì×ÝÛ åÜ §

'UDZLQJ 6WDWXV ÂÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

Ïè×êÛ ¿åÛÛ ÏÞ×êÛ

ÏÙ×âÛ Ž ½ "

Æ×ÙåØé Êå À #"%

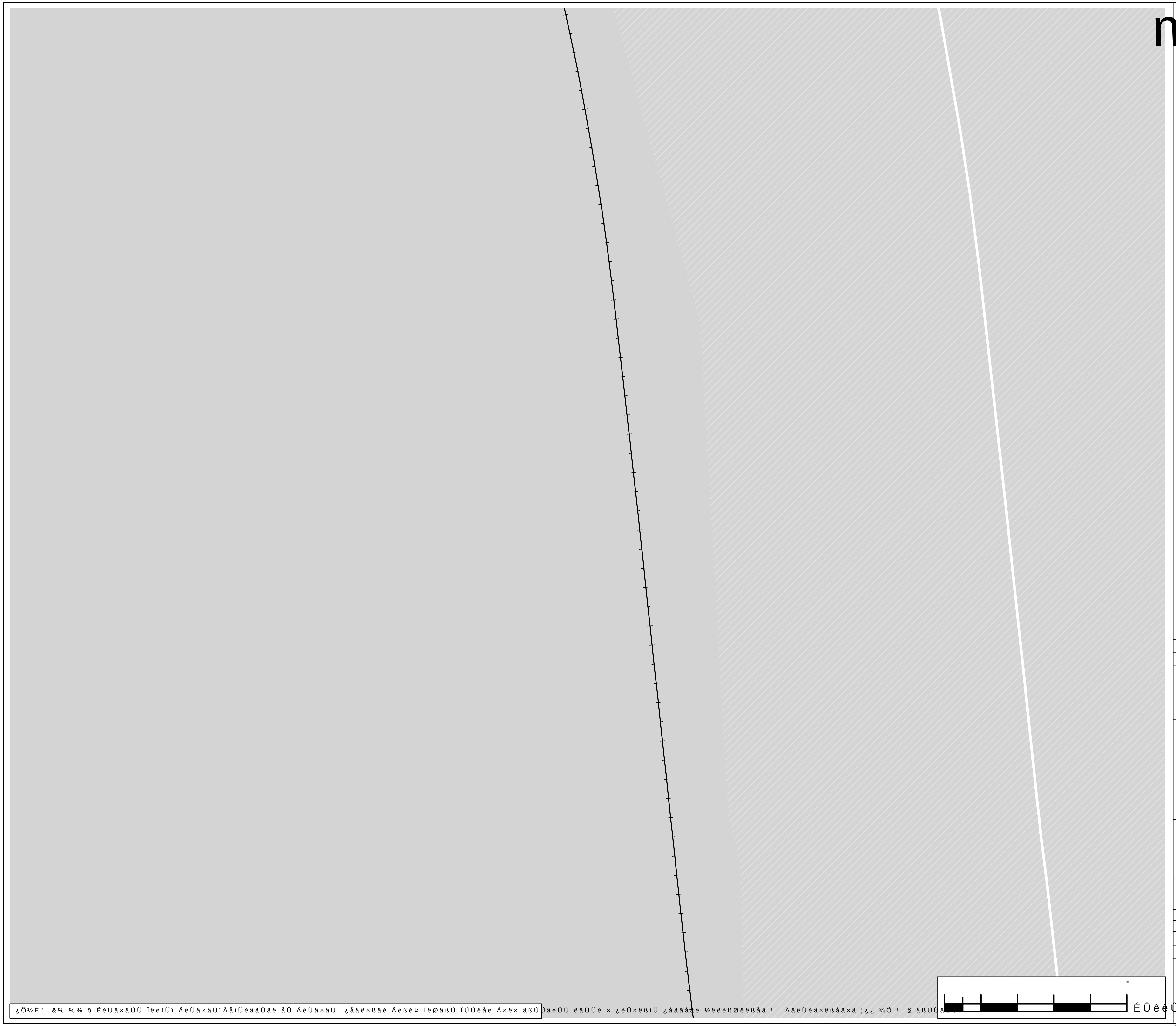
¿åßÛäé Êå % &

Âè×íßäÝ Êå &&$ B 3 ':* (9 -$&

ÂË ÊËÐ ÏÙ½ÈÁ

ÏÛÏ Ò

õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÙ ËßâßêÛÙ
ÛåäÛ×ßäÛÙ ßä êÞßé Ûâ×Øåè×êÛ ×éÛ êÞÛ æèåæÛèêï åÜ Æ×ÙåØ
íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä Ùåäéåäê åÜ Æ×
Û×ÝÛèêßÛ éÛ ßéé ßäÜåèä×êßåäé ÐÞßé Ùå×ÙåäÛäé ÛÙ
Æ×ÙåØé ¿åäêßäêé ×äÙ ßé éåÛéÛÙ ÜåäÙ ßä ×ÙÙÛèÙ
ÉÛäêåäÛÙ ×äÙ éÛÛÛÙ ¿åäêèåÛ Æ×ÙåØé ×ÙÙåêÛÛé
ÛÜÛäÛÛÛ åÜ ×ïé ÛéÛ åÜ êÞÛ ÙåßèäÛäê ÛÜÛåÛ êÞßé Ùå×Üßäè



¿Õ½È" &% %% õ ËèÚä×äÙÛ ÏëèìÛï ÅèÛâ×äÚ¨ÃåìÛèäãÛäê åÜ ÅèÛâ×äÚ ¿åäê×ßäé ÅèßéÞ ÌëØâßÙ ÏÛÙêåè À×ê× âßÙÛäéÛÚ ëäÚÛè × ¿èÛ×êßìÛ ¿åããåäé ½êêèßØëêßåä ! Åäêèäá×êßåä×â ¦¿¿ ¾Õ ! § âßÙÛäéÛ

ÂÅÃÑÎÁ

/HJHQG

&&$ 6WXG\ $UHD

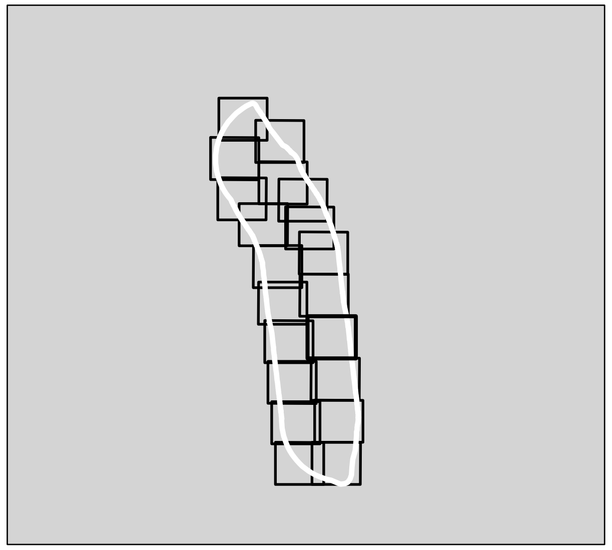
⊢ 5DLOZD\ 1HWZRUN &HQWUHOLQ

'+/*+)RUHVKRUH 2IIVKRUH 5HQHZDEOH (QHUJ\ 'DWD

▨ 'HWHUPLQDWLRQ

5HIHUHQFH IRU '+/*+

$:LQG
% :DYH
& 7LGDO
' &RPELQDWLRQ



Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		Ìëèæåéû åÜ èÛìßéßåä	Àè×í	¿ÞÛÙ	áÎŴì	Ú½ææè Ú

¿âßÛäê

ÀÛéßÝäÛè

ÉÛèèßåä ÄåëéÛ ÉÛèèßåä ÎÚ ÀëØâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ùåã

Ìèåàâ ÛÙê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ Ðßêâ Û

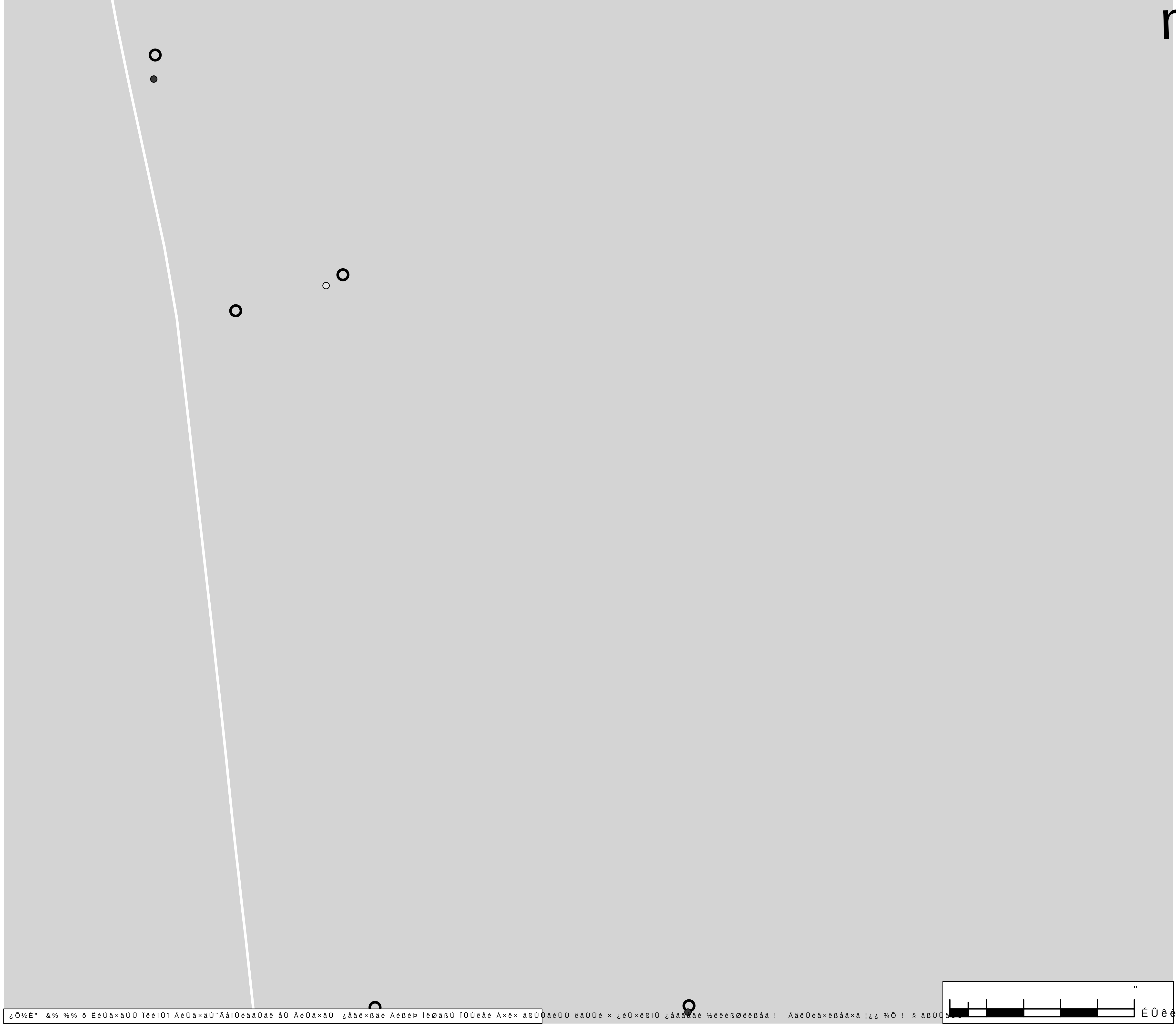
ÂßÝëèÛ
¿¿½# Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×ä
¦Ì×ÝÛ åÜ §

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

Ïê×êÛ ¿åÚÛ	ÌÞ×éÛ	
ÏÙ×âÛ Ž ½	"	ÀË ÊËÐ Ï¿½ÈÁ
Æ×ÙåØé Êå	À #"%	ÎÛì Ò
¿âßÛäê Êå	% &	
Àè×íßäÝ Êå	&&$ B 3 ':* (9 -$&	

õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ Èßãßê ÛÚ
Ùåäê×ßäÛÚ ßä êÞßé ÚåÙëãÛäê ×èÛ êÞÛ æèåæÛèêï åÜ Æ×ÙåØ
íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ×
ÙåæïèßÝÞê Èßãßê×êßåä ÐÞßé Úè×íßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ
Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßééëÛÚ ßä ×ÙÙåèÚ
ØÛêíÛÛä Æ×ÙåØé ×äÚ êÞÛ ¿âßÛäê Æ×ÙåØé ×ÙÙÛæêé äå âß×Ø
èÛéæÛÙê åÜ ×äï ëéÛ åÜ åè èÛâß×äÙÛ ëæåä êÞßé Úè×íßäÝ Øï

Ì×êÞ ©©ÝØâåä ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥ÁäìßèåäãÛäê×â¥¿åäéêè×ßäêé¥ÎÛæåèê© ¥Á



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ÂÅÃÑÎÁ

/HJHQG

&&$ 6WXG\ $UHD /DQG 8VH =RQLQJV :LFNOR

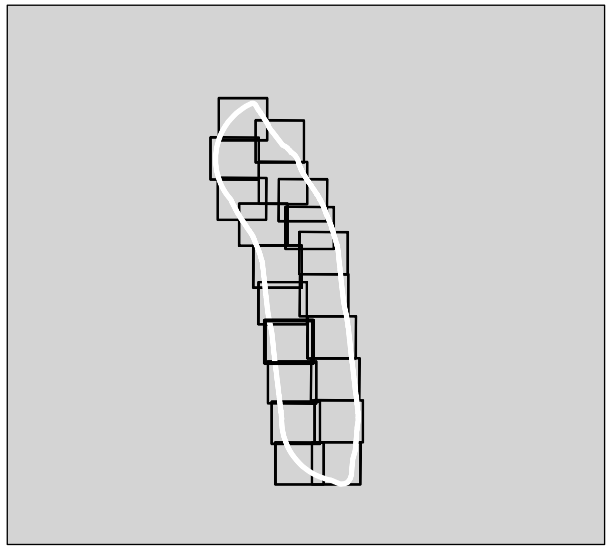
3ODQQLQJ $SSOLFDWLRQV $GRSWHG 2SHQ 6SD
&RXQW\ &RXQFLO

● *UDQWHG
○ 5HIXVHG
○ /LYH

((PSOR\PHQW
5 6SHFLDO 6SHFLDO 5
5(([LVWLQJ 5HVLGHQ
7 7RXULVP

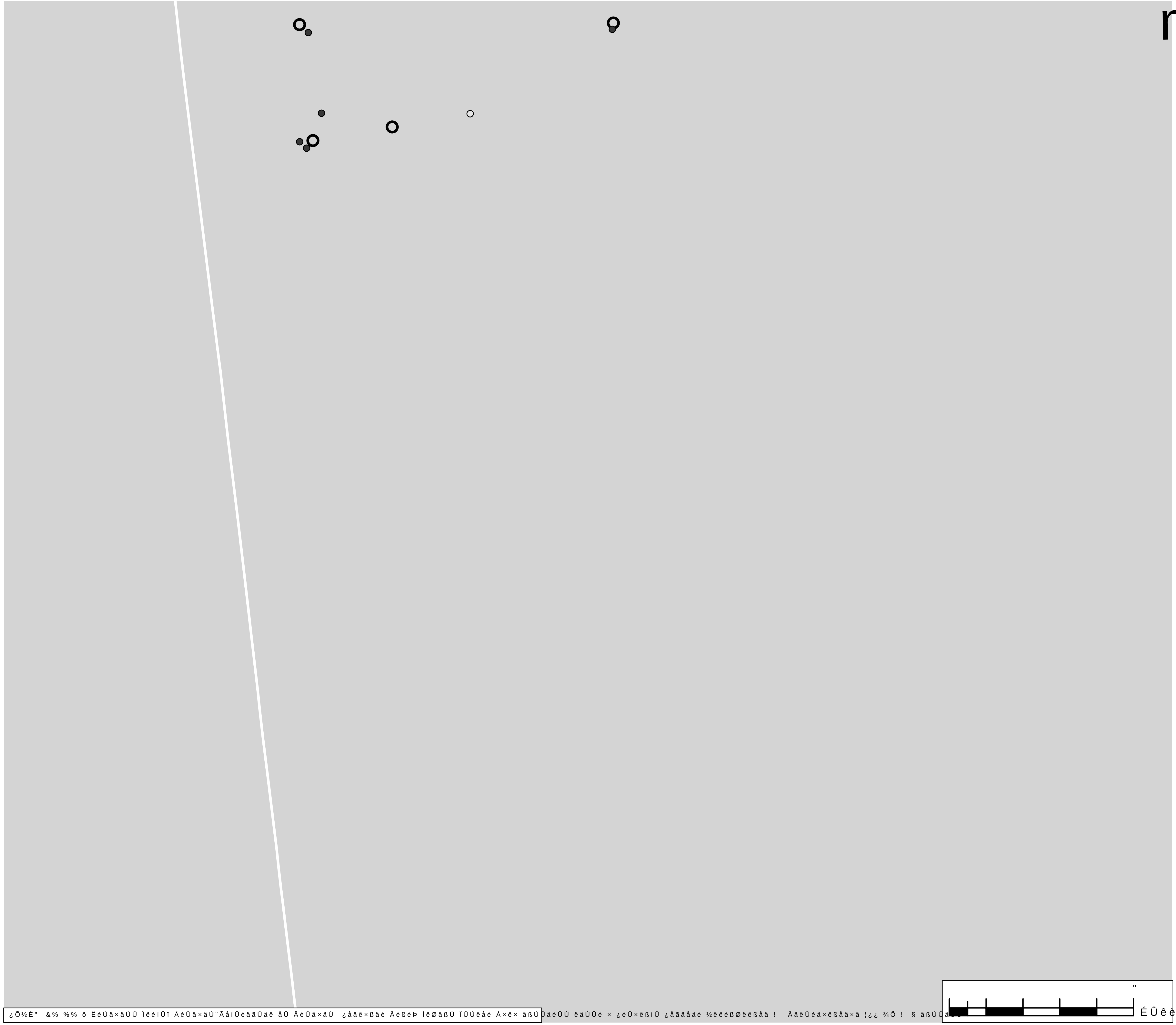
5HIHUHQFH IRU '+/*+

$:LQG
% :DYH
& 7LGDO
' &RPELQDWLRQ



ÂÅÃÑÎÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

&&$ B 3 ':* (9 -$&



ÂÅÃÑÎÁ

/HJHQG

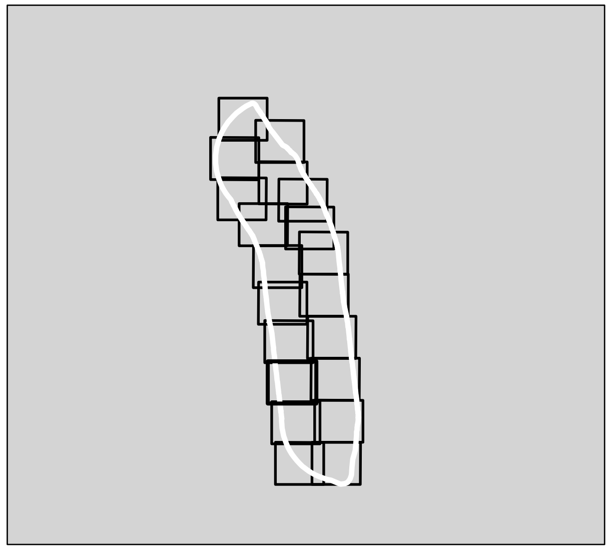
&&$ 6WXG\ $UHD /DQG 8VH =RQLQJV :LFNOR

3ODQQLQJ $SSOLFDWLRQV 7:LFNORZ &RXQW\ &RXQFLO 7RUQDZVP

- ● *UDQWHG
- ○ 5HIXVHG
- ○ /LYH

5HIHUHQFH IRU '+/*+

$:LQG
% :DYH
& 7LGDO
' &RPELQDWLRQ



Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		Ìëèæåé Û åÜ èÛìßéßåä	Àè×í	ä¿ÞÛÙ	áÎŴì	Ú½ææè Ú

¿âßÛäê

ÀÛéßÝäÛè

ÉÛèèßåä ÄåëéÛ ÉÛèèßåä ÎÚ Àëøâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ûåã

ÌèåàÛÙê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ Ðßêâ Û

ÂßÝëèÛ
¿¿½# Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×ä
¦Ì×ÝÛ " åÜ §

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

Ïê×êÛ ¿åÚÛ	ÌÞ×éÛ		
ÏÙ×âÛ Ž ½	"	ÀË ÊËÐ Ï¿½ÈÁ	
Æ×ÙåØé Êå	À #"%	ÎÛì	Ò
¿âßÛäê Êå	% &		
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õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ Èßãßê ÛÚ Ùåäê×ßäÛÚ ßä êÞßé ÚåÙëãÛäê ×èÛ êÞÛ æèåæÛèêï åÜ Æ×ÙåØé íÞååâ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ× ÙåæïèßÝÞê ÈßãßêÛ×êßåä ÐÞßé ÚèÛíßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßéééëÛÚ ßä ×ÙÙåèÚ ØÛêíÛÛä Æ×ÙåØé ×äÚ êÞÛ ¿âßÛäê Æ×ÙåØé ×ÙÙÛæêé äå âß×Ø èÛéæÛÙê åÜ ×äï ëéÛ åÜ åè èÛâß×äÙÛ ëæåä êÞßé ÚèÛíßäÝ Øï

Ì×êÞ ©©ÝØâåä ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥ÁäìßèåäãÛäê×â¥¿åäéêè×ßäêé¥ÎÛæåèê©

¿Õ½Ë" &% %% õ ËèÛä×ÚÛ ÏëèìÛï ÅèÛâ×äÚ¯ÃåìÛèäãÛäê åÜ ÅèÛâ×äÚ ¿åäê×ßäé ÂèßêéÞ ÌëØâßÙ ÏÛÙêåè Åäåèã×êßåä âßÙÛäéÛÚ ëäÚÛè ×¿èÛ×êßìÛ ¿åããåäé ½êêèßØëêßåä ! ÅäêÛèä×êßåä×â ¦¿¿ ¾Ö ! § âßÙÛäÛÛ

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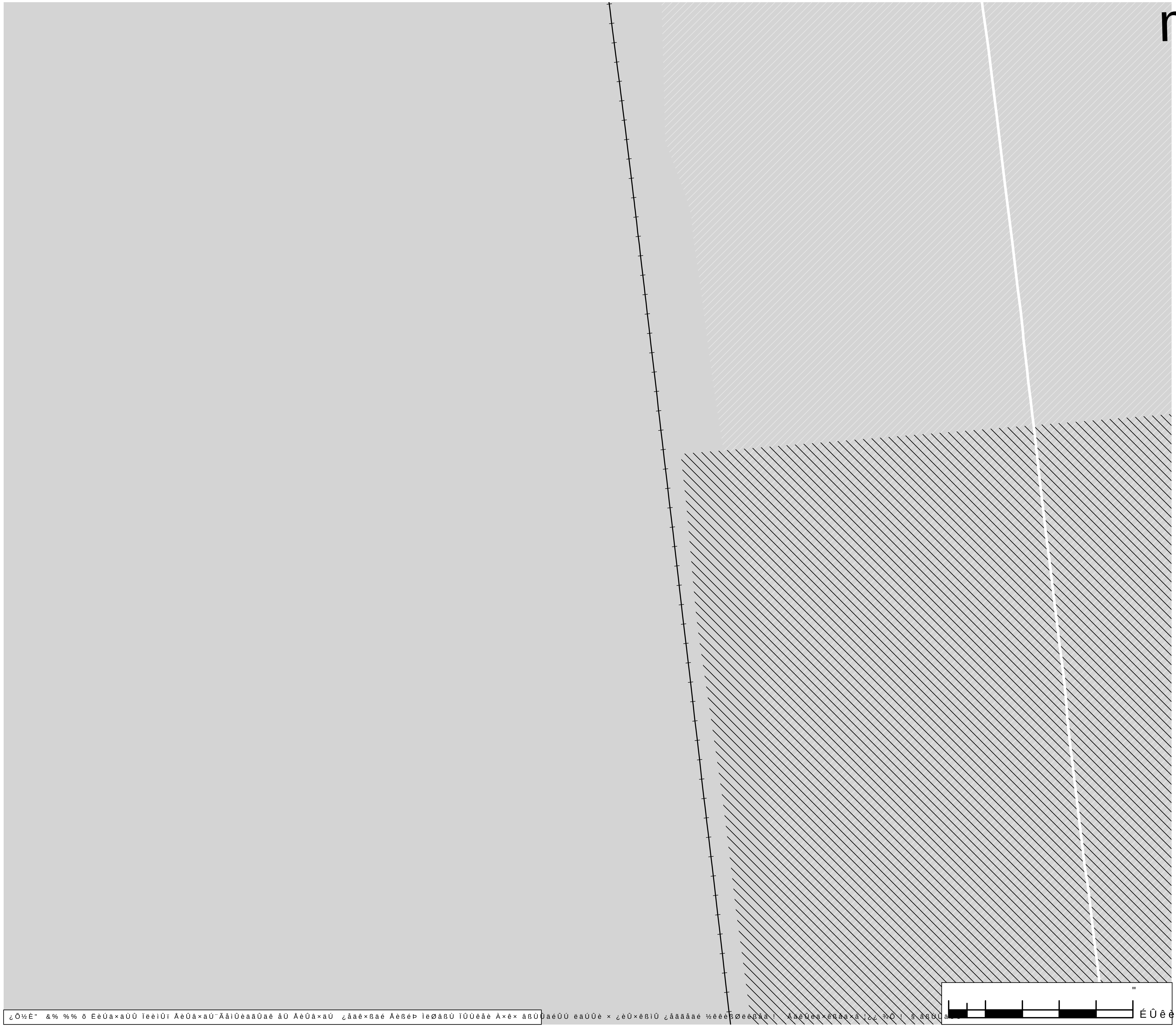

¿Õ½È" &% %% õ ËèÚä×äÙÛ ÏëèìÛï ÅèÛâ×äÚ¨ÃåìÛèääÃÛäê åÜ ÅèÛâ×äÚ ¿åäê×ßäé ÅèßéÞ ÌëØâßÙ ÏÛÙêåè À×ê× âßÙÛäéÛÚ ëäÚÛè × ¿èÛ×êßìÛ ¿åããåäé ½êêèßØëêßåä ! Åäêåèä×êßåä×â ¦¿¿ ¾Õ ! § âßÙÛä

ÂÅÃÑÎÁ

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&&$ 6WXG\ $UHD

5DLOZD\ 1HWZRUN &HQWUHOLQ

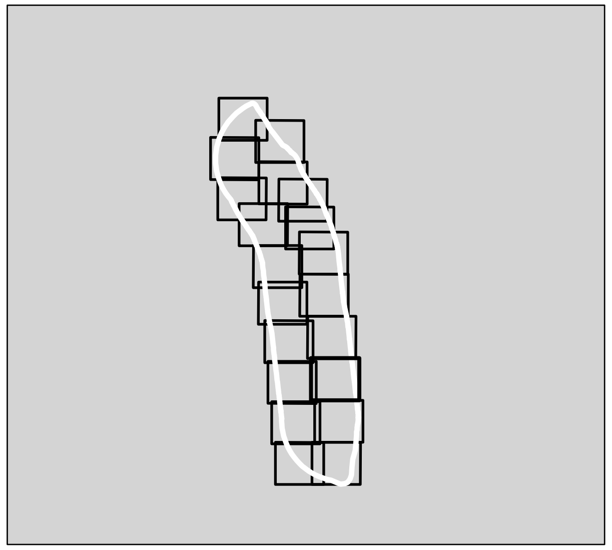
'+/*+)RUHVKRUH 2IIVKRUH 5HQHZDEOH (QHUJ\ 'DWD

▧ $SSOLHG

▨ 'HWHUPLQDWLRQ

5HIHUHQFH IRU '+/*+

$:LQG
% :DYH
& 7LGDO
' &RPELQDWLRQ



Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		ÌëèæåéÛ åÜ èÛìßéßåä	Àè×íä	¿ÞÛÙáÛÚ	½ææèåìÛÚ	

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$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ Ðßêâ Û

ÂßÝëèÛ
¿¿½# Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×ä
¦Ì×ÝÛ # åÜ §

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

Ïê×êÛ ¿åÚÛ	ÌÞ×éÛ
ÏÙ×âÛ Ž ½	"
Æ×ÙåØé Êå	À #"%
¿âßÛäê Êå	% &
Àè×íßäÝ Êå	&&$ B 3 ':* (9 -$&

ÀË ÊËÐ ÏÙ½ÈÁ

ÎÛì Ò

õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ Èßãßê ÛÚ
ÙåäêÛ×ßäÛÚ ßä êÞßé ÚåÙëãÛäê ×èÛ êÞÛ æèåæÛèêï åÜ Æ×ÙåØ
íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ×
ÙåæïèßÝÞê ÈßãßêÛ×êßåä ÐÞßé Úè×íßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ
Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßéééëÛÚ ßä ×ÙÙåèÚ
ØÛêíÛÛä Æ×ÙåØé ×äÚ êÞÛ ¿âßÛäê Æ×ÙåØé ×ÙÙÛæêé äå âß×Ø
èÛéæÛÙê åÜ ×äï ëéÛ åÜ åè èÛâß×äÙÛ ëæåä êÞßé Úè×íßäÝ Øï

Ì×êÞ ©©ÝØâåä ìé ©ÃÅÏÌèåàÛÙêé©À #"% ¥Á¿ÎÅÌ©½èÙÃÅÏ© &¥Áäìßèåää ÛäêÛ×â¥¿åäéë×ä×ÛäÛé×ßäÛ¥ÎÛæåèêè©

ÂÅÃÑÎÁ

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&&$ 6WXG\ $UHD

┼ 5DLOZD\ 1HWZRUN &HQWUHOLQ

▬ 5LJKW RI :D\

3ODQQLQJ $SSOLFDWLRQV :LFNORZ
&RXQW\ &RXQFLO

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'+/*+)RUHVKRUH 2IIVKRUH
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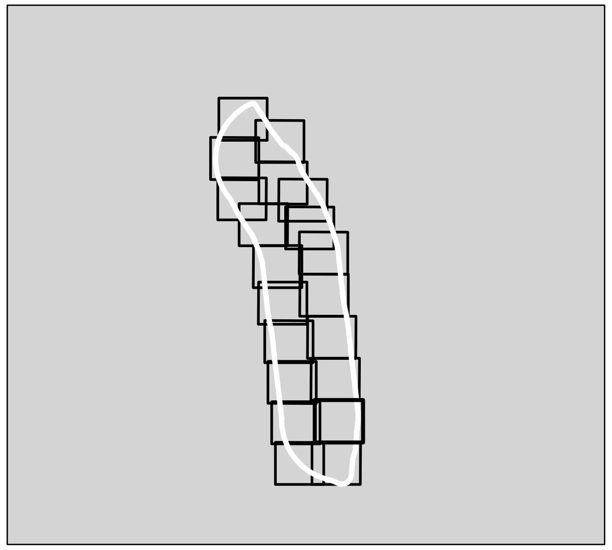

Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		ÌëèæåéÛ åÜ èÛìßéßåä	Àè×í	ä¿ÞÛÙ	áÎ₩ì	Ú½ææè Ú

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ÀÛéßÝäÛè

ÉÛèèßåä ÄåëéÛ ÉÛèèßåä ÎÚ ÀëØâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ùåã

ÌèåàÛÙê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ ÐßêâÛ

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¿¿½# Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×ä
¦Ì×ÝÛ $ åÜ §

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

Ïê×êÛ ¿åÚÛ	ÌÞ×éÛ		
ÏÙ×âÛ Ž ½	"	ÀË ÊËÐ Ï¿½ÈÁ	
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¿âßÛäê Êå	% &		
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õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ Èßãßê
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ÙåæïèßÝÞê ÈßãßêÛ×êßåä ÐÞßé Úè×íßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ
Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßéééëÛÚ ßä ×ÙÙåèÚ
ØÛêíÛÛä Æ×ÙåØé ×äÚ êÞÛ ¿âßÛäê Æ×ÙÙÛæêé ää âß×Ø
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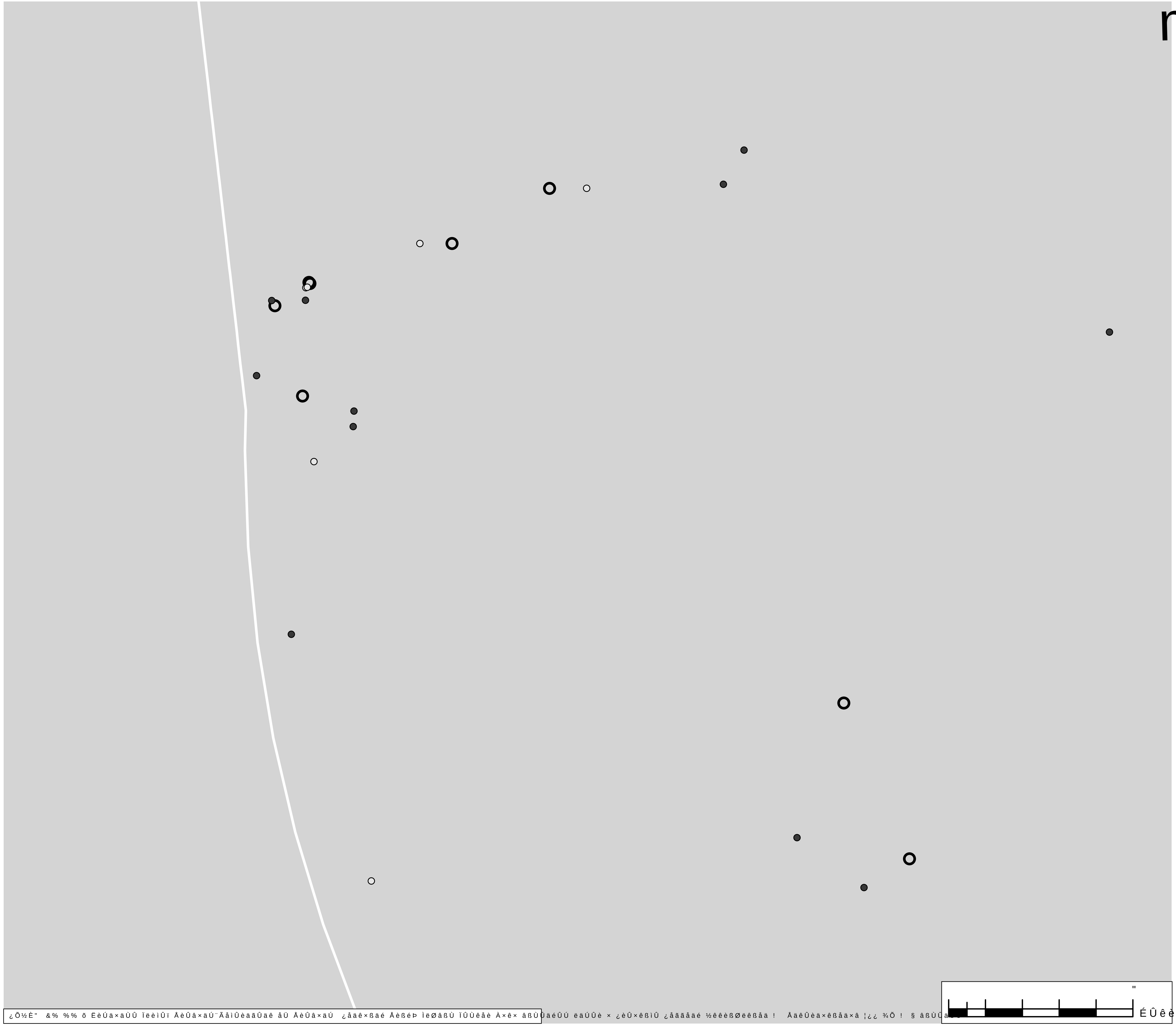
Ì×êÞ ©©ÝØâåå ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥ÁäìßèåääÛäê×â¥¿åäéêè×ßäêé¥ÎÛæåèè©



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ÂÅÃÑÎÁ

/HJHQG

&&$ 6WXG\ $UHD /DQG 8VH =RQLQJV :LFNOR

3ODQQLQJ $SSOLFDWLRQV &RXQW\ &RXQFLO

- ● *UDQWHG
- ○ 5HIXVHG
- **O** /LYH

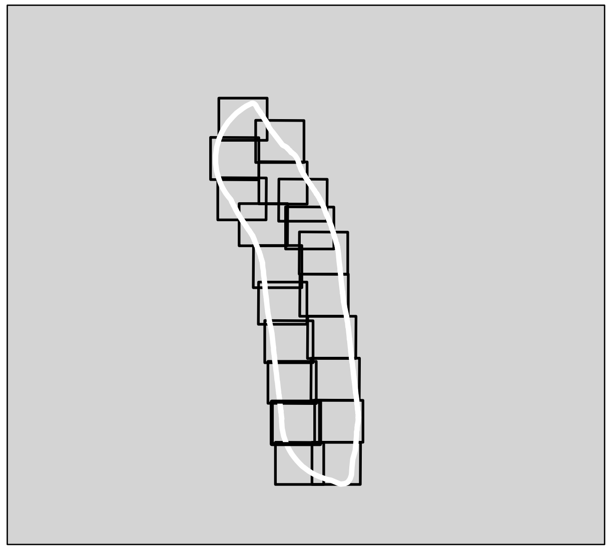
3:LFNORZ 3ULPDU\ 'HYHORSPHQW $UHD

6'$ 6HFRQGDU\ 'HYHORSPHQW $UHD

7'$ 7HUWLDU\ 'HYHORSPHQW $UHD

5HIHUHQFH IRU '+/*+

$:LQG
% :DYH
& 7LGDO
' &RPELQDWLRQ



Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		Ìëèæåéû åÜ èÛìßéßåä	Àè×íä	¿ÞÛÙáÛÚ	½ææ	èå Ú

¿âßÛäê

ÀÛéßÝäÛè

ÉÛèèßåä ÄåëéÛ ÉÛèèßåä ÎÚ ÀëØâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ùåã

Ìèåàê Ùê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ Ðßêâû

ÂßÝëèÛ
¿¿½# Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×ä
¦Ì×ÝÛ % åÜ §

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

ÏÙ×âÛ ¿åÚÛ	ÌÞ×éÛ	
ÏÙ×âÛ Ž ½	"	ÀË ÊËÐ Ï¿½ÈÁ
Æ×ÙåØé Êå	À #"%	ÎÛì Ò
¿âßÛäê Êå	% &	
Àè×íßäÝ Êå	&&$ B 3 ':* (9 -$&	

õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ Èßãßê
ÙåäêßäÛÚ ßä êÞßé ÚåÙëãÛäê ×èÛ êÞÛ æèåæÛèêï åÜ Æ×ÙåØ
íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ×
ÙåæïèßÝÞê Èßãßê×êßåä ÐÞßé Úè×íßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ
Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßéééëÛÚ ßä ×ÙÙåèÚ
ØÛêíÛÛä Æ×ÙåØé ×äÚ êÞÛ ¿âßÛäê Æ×ÙåØé ×ÙÙÛæêé äå âß×Ø
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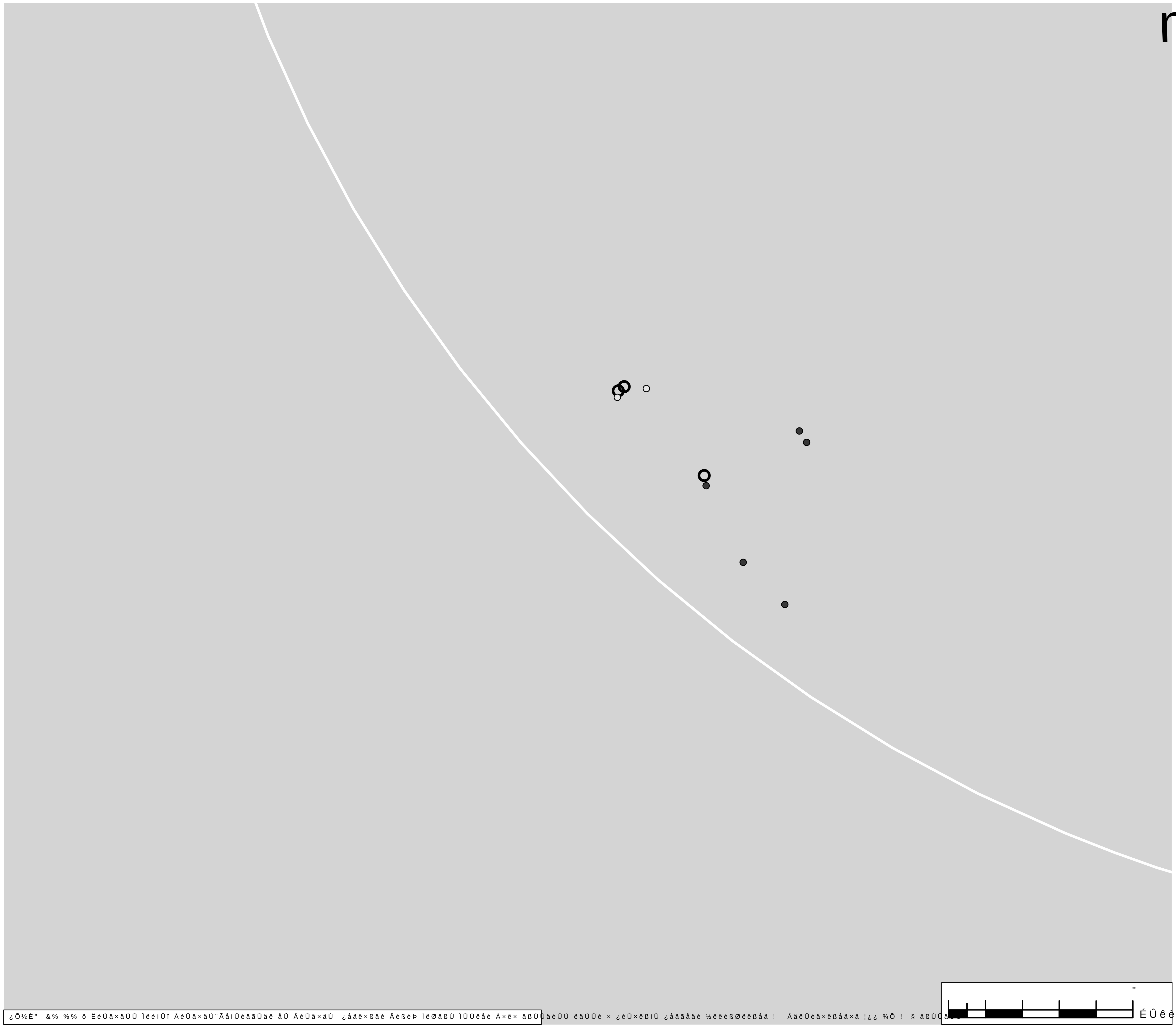
Ì×êÞ ©©ÝØâåä ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥Áäìßèåää Ûäê×â¥¿åäéêè×ßäêé¥ÎÛæåèêé© ¥Å



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ÂÅÃÑÎÁ

/HJHQG

&&$ 6WXG\ $UHD

3ODQQLQJ $SSOLFDWLRQV :LFNOR
&RXQW\ &RXQFLO

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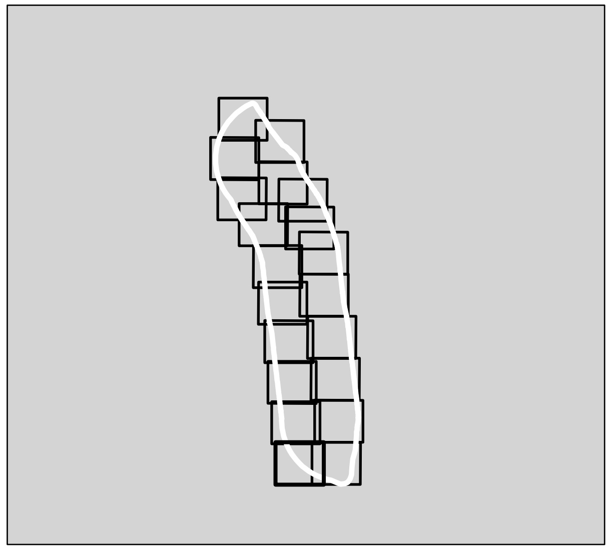

Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		ÌëèæåéÛ åÜ èÛìßéßåä	Àè×í	¿ÞÛÙ	áÎ Ŵì	Ú½ææè Ú

¿âßÛäê

ÀÛéßÝäÛè

ÉÛèèßåä ÄåëéÛ ÉÛèèßåä ÎÚ ÀëØâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ùåã

ÌèåàÛÙê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ Ðßêâÿ

ÂßÝëèÛ
¿¿½# Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×ä
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'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

Ïê×êÛ ¿åÚÛ	ÌÞ×éÛ		
ÏÙ×âÛ Ž ½	"	ÀË ÊËÐ Ï¿½ÈÁ	
Æ×ÙåØé Êå	À #"%	ÎÛì	Ò
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õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ Èßãßê ÛÚ
ÙåäêÛäêé ×äÚ ÚÛéßÝä ê×ÜÛä åèßÝßä×âé åÜ Æ×ÙåØ
íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ×
ÙåæïèßÝÞê Èßãßê×êßåä ÐÞßé Úè×íßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ
Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßééëÛÚ ßä ×ÙÙåèÚ
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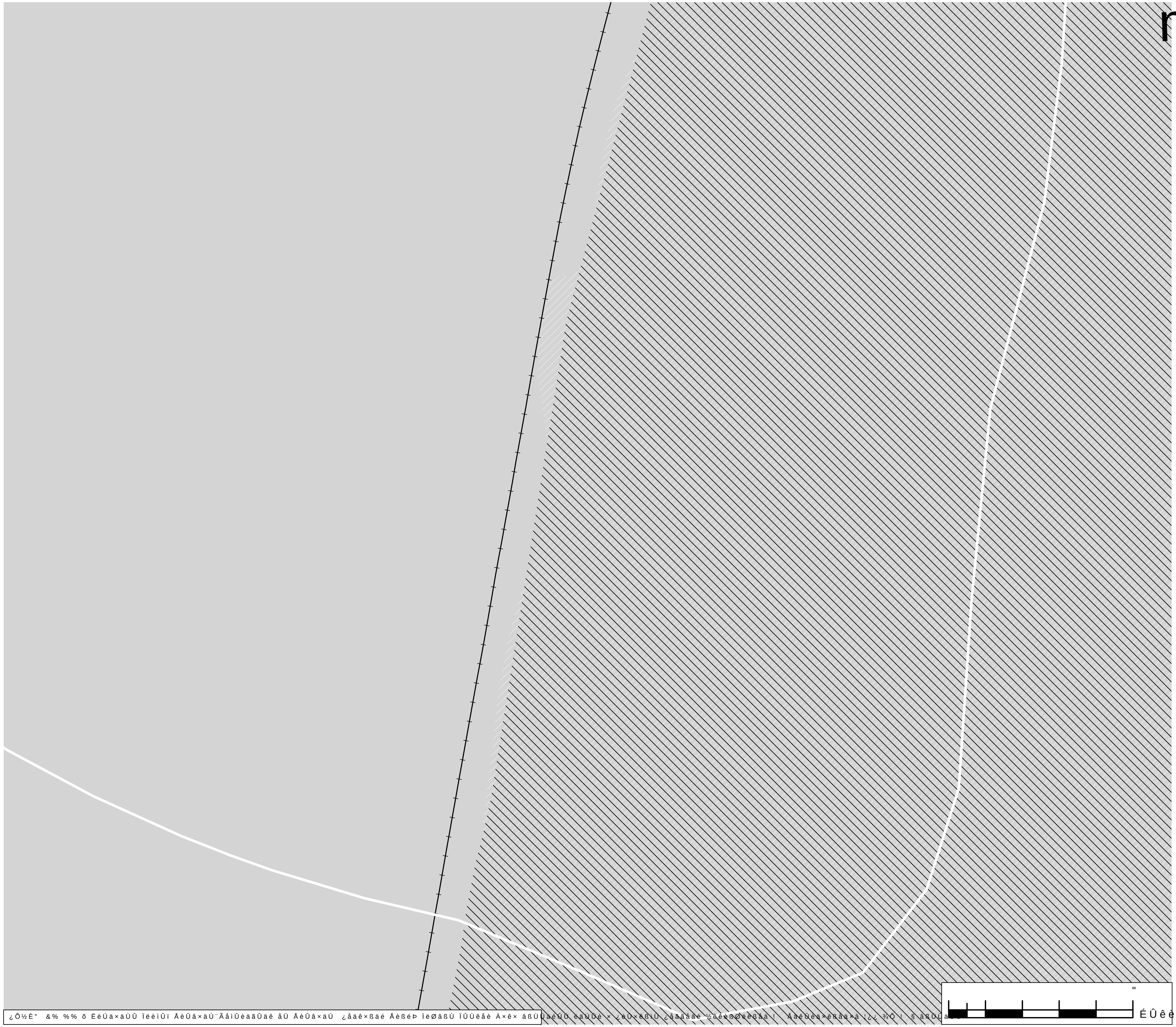
Ì×êÞ ©©ÝØâåå ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥Áäìßèåää ÛäêׯâÅäéêß×éëéÅ¥ÎÛæåèê©



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ÂÅÃÑÎÁ

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5DLOZD\ 1HWZRUN &HQWUHOLQ

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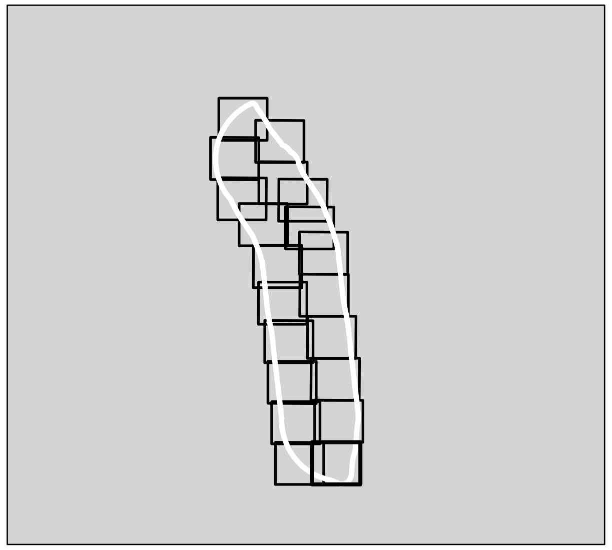

Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		Ìëèæåéû åÜ èÛìßéßåä	Àè×í	ä¿ÞÛÙ	áÎÜÿì	Ú½ææè Ú

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ÀÛéßÝäÛè

ÉÛèèßåä Äåëéû ÉÛèèßåä ÎÚ ÀëØâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ùåã

ÌèåàÛÙê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ Ðßêâû

ÂßÝëèÛ
¿¿½# Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×ä
¦Ì×ÝÛ åÜ §

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

Ïê×êÛ ¿åÚÛ	ÌÞ×éÛ	
ÏÙ×âÛ Ž ½	"	ÀË ÊËÐ Ï¿½ÈÁ
Æ×ÙåØé Êå	À #"%	ÎÛì Ò
¿âßÛäê Êå	% &	
Àè×íßäÝ Êå	&&$ B 3 ':* (9 -$&	

õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ ÈßãßêÛÚ
ÙåäêÛ×ßäÛÚ ßä êÞßé ÚåÙëãÛäê ×èÛ êÞÛ æèåæÛèêï åÜ Æ×ÙåØé
íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ×
ÙåæïèßÝÞê ÈßãßêסêßåÜ ÐÞßé Úè×íßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ
Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßééëÛÚ ßä ×ÙÙåèÚ
ØÛêíÛÛä Æ×ÙåØé ×äÚ êÞÛ ¿âßÛäê Æ×ÙåØé ×ÙÙÛæêé äå âß×Ø
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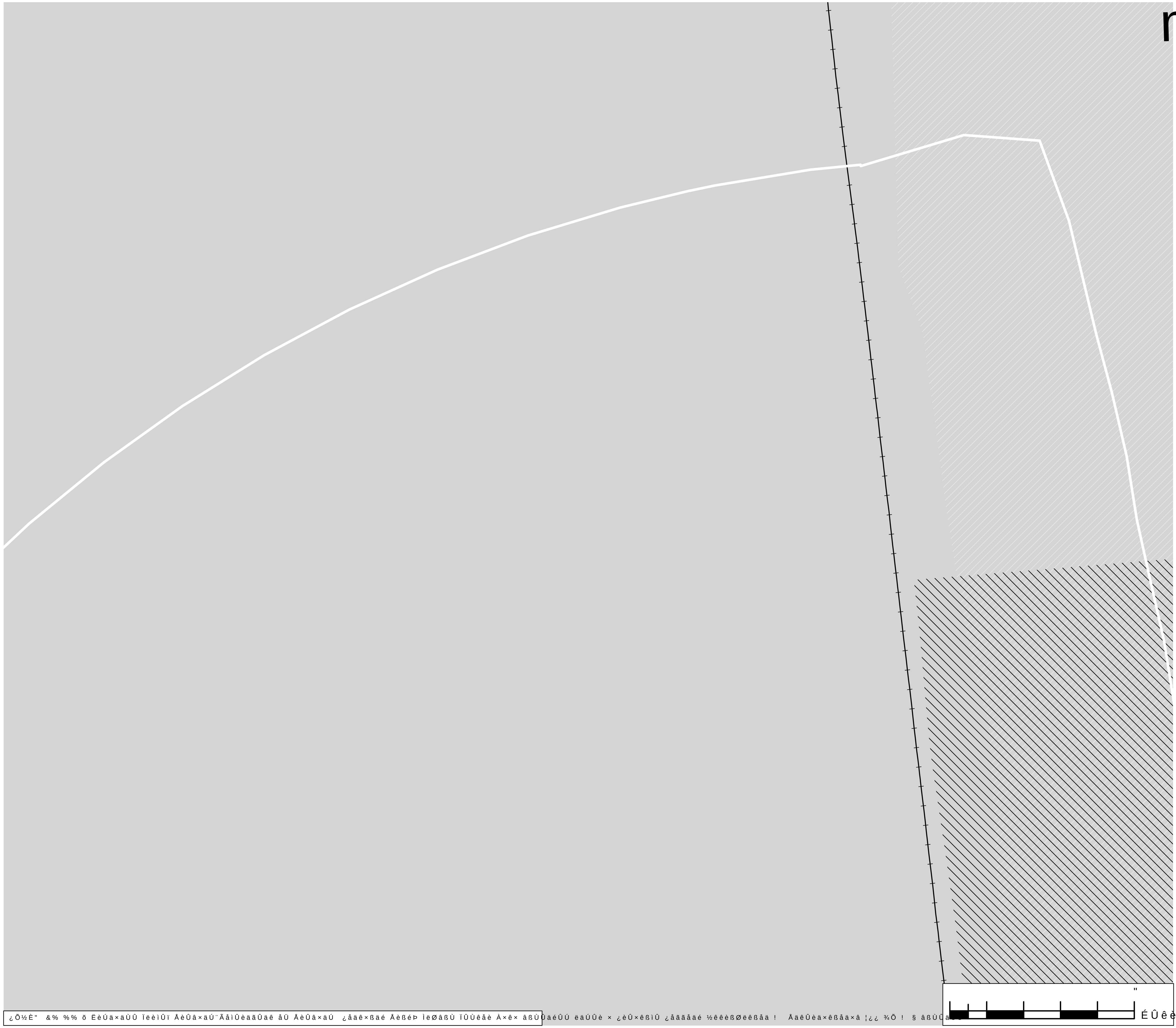
Ì×êÞ ©©ÝØâåå ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥ÁäìßèåäãÛäê×â¥¿åäéêè×ßäêé¥ÎÛæåèê©



ÂÅÃÑÎÁ

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&&$ 6WXG\ $UHD

5DLOZD\ 1HWZRUN &HQWUHOLQH

'+/*+)RUHVKRUH 2IIVKRUH 5HQHZDEOH (QHUJ\ 'DWD

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5HIHUHQFH IRU '+/*+

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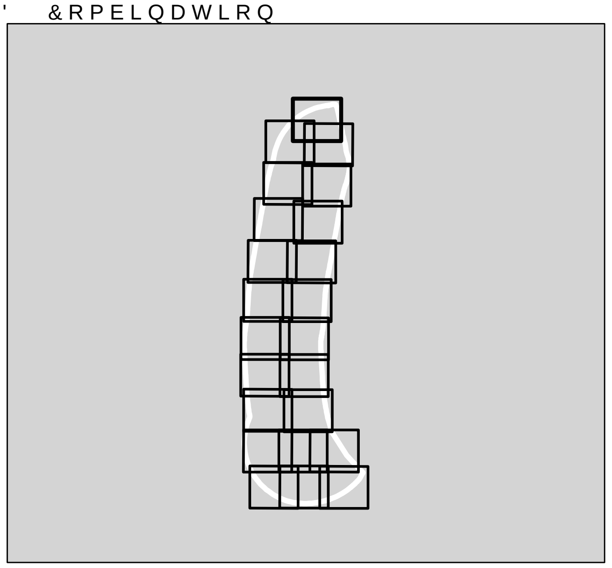


Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		Ìëèæåéê åÜ èÛìßéßåä	À è×í	ä¿ÞÛÙ	áÎ÷ì	Ú½ææè Ú

¿âßÛäê

ÀÛéßÝäÛè

ÉÛèèßåä ÄåëéÛ ÉÛèèßåä ÎÚ ÀëØâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ùåã

Ìèåà ÛÙê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ Ðßêâ Û

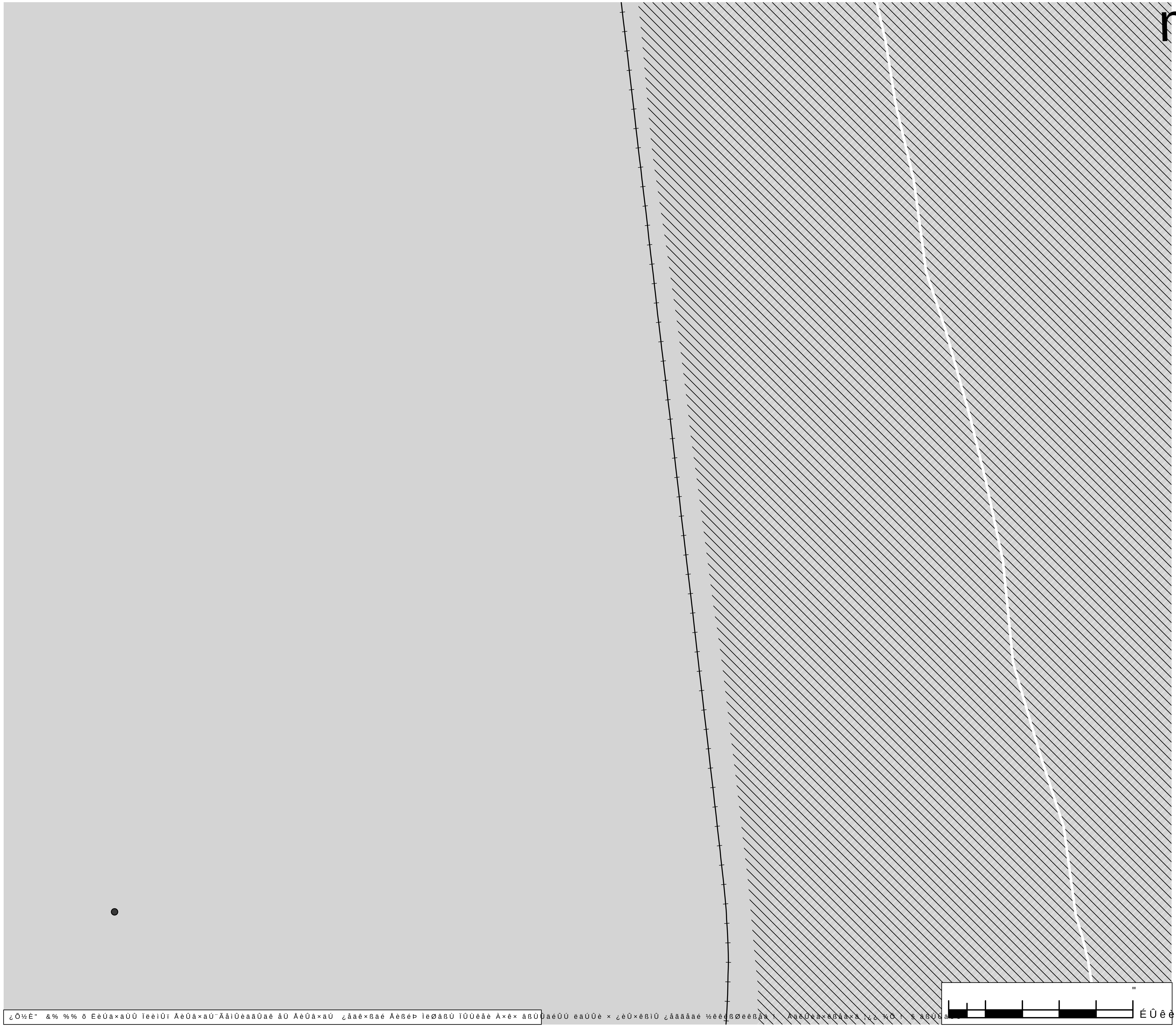
ÂßÝëèÛ
¿¿½# Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×ä
¦Ì×ÝÛ åÜ §

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

Ïê×êÛ ¿åÚÛ	ÌÞ×éÛ		
ÏÙ×âÛ Ž ½	"	ÀË ÊËÐ Ï¿½ÈÁ	
Æ×ÙåØé Êå	À #"%	ÎÛì	Ò
¿âßÛäê Êå	% &		
Àè×íßäÝ Êå	&&$ B 3 ':* (9 -$&		

õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ Èßãßê
Ùåäê×ßäÛÚ ßä êÞßé ÚåÙëãÛäê ×èÛ êÞÛ æèåæÛèêï åÜ Æ×ÙåØ
íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ×
ÙåæïèßÝÞê Èßãßê×êßåä ÐÞßé Úè×íßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ
Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßééëÛÚ ßä ×ÙÙåèÚ
ØÛêíÛÛä Æ×ÙåØé ×äÚ êÞÛ ¿âßÛäê Æ×ÙåØé ×ÙÙÛæêé äå âß×Ø
èÛéæÛÙê åÜ ×äï ëéÛ åÜ åè èÛâß×äÙÛ ëæåä êÞßé Úè×íßäÝ Øï

Ì×êÞ ©©ÝØâåä ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥Áäìßèåäãäêë×â¥¿åäééè×ßäêé¥ÎÛæåèê©



ÂÅÃÑÎÁ

/HJHQG

&&$ 6WXG\ $UHD

5DLOZD\ 1HWZRUN &HQWUHOLQH

3ODQQLQJ $SSOLFDWLRQV :LFNORZ &RXQW\ &RXQFLO

● *UDQWHG

'+/*+)RUHVKRUH 2IIVKRUH 5HQHZDEOH (QHUJ\ 'DWD

▨ $SSOLHG

▨ 'HWHUPLQDWLRQ

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& 7LGDO
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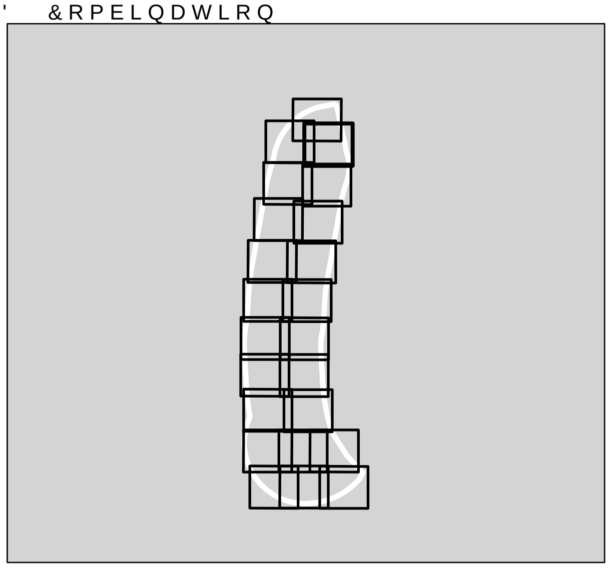

Ò	É×è	! ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ	Ìëèæåéû åÜ èÛìßéßåä	Àè×í	ä¿ÞÛÙ	áÎẀì	Ú½ææè Ú

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ÉÛèèßåä ÄåëéÛ ÉÛèèßåä ÎÚ ÀëØâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ùåã

ÌèåàÛÙê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ Ðßêâ Û

ÂßÝëèÛ
¿¿½# Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×ä
¦Ì×ÝÛ åÜ §

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

Ïê×êÛ ¿åÚÛ	ÌÞ×éÛ	
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Æ×ÙåØé Êå	À #"%	ÎÛì Ò
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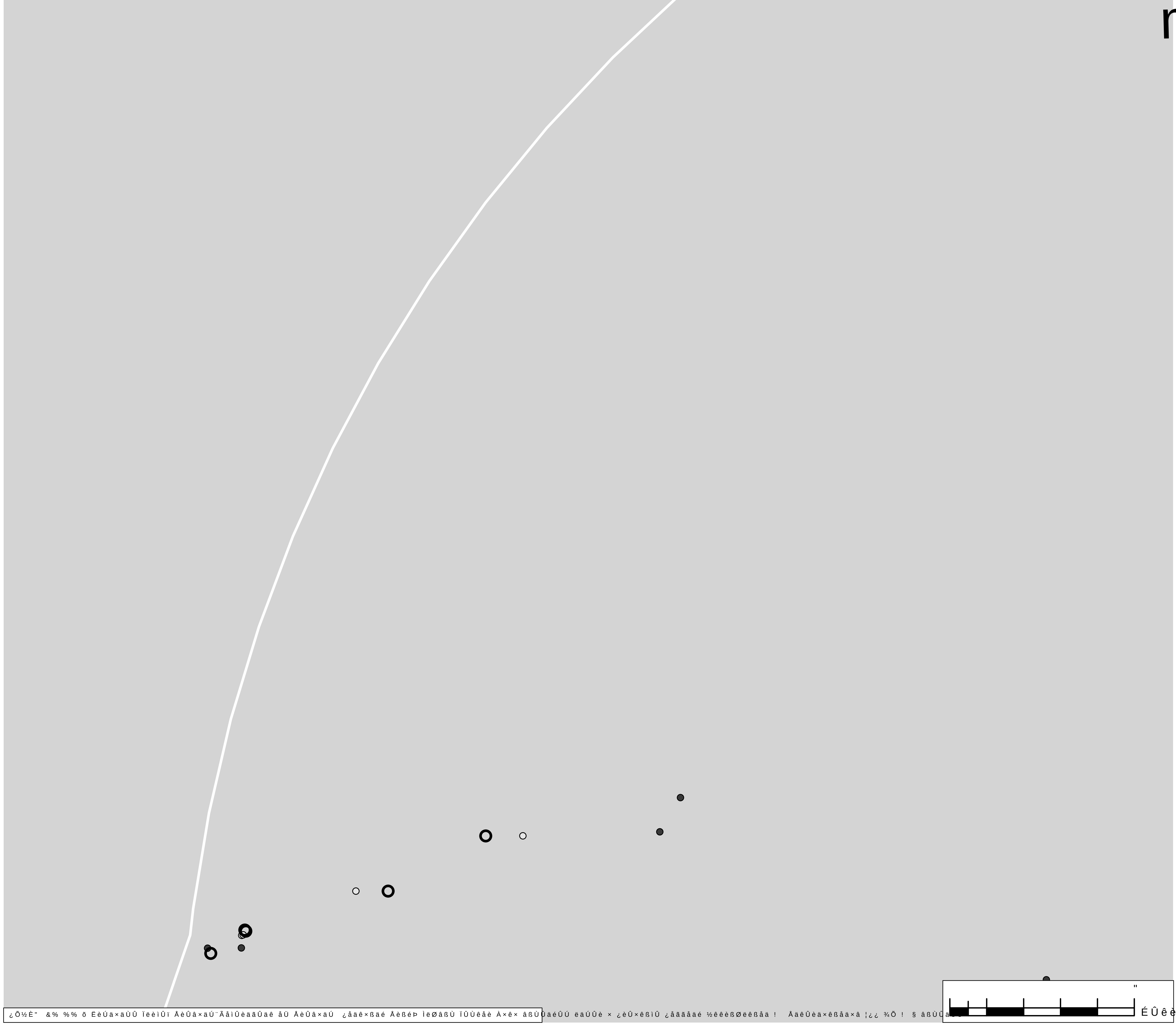
õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ Èßãßê ÛÚ Ùåäê×ßäÛÚ ßä êÞßé ÚåÙëãÛäê ×èÛ êÞÛ æèåæÛèêï åÜ Æ×ÙåØé íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ× ÙåæïèßÝÞê Èßãßê×êßåä ÐÞßé Úè×íßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßéééëÛÚ ßä ×ÙÙåèÚ ØÛêíÛÛä Æ×ÙåØé ×äÚ êÞÛ ¿âßÛäê Æ×ÙåØé ×ÙÙÛæêé ää âß×Ø èÛéæåÛÙê åÜ ×äï ëéÛ åÜ åè èÛâß×äÙÛ ëæåä êÞßé Úè×íßäÝ Øï

Ì×êÞ ©©ÝØåå ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥Áäìßèåää ÛäêÞ×â¥¿åäéêè×ßäêé¥ÎÛæåèêé©



¿Õ½È" &% %% õ ËèÚä×äÙÛ ÏëèìÛï ÅèÛâ×äÚ¨ÃåìÛèäãÛäê åÜ ÅèÛâ×äÚ ¿åäê×ßäé ÅèßéÞ ÌëØâßÙ ÏÛÙêåè À×ê× âßÙÛäéÛÚ ëäÚÛè × ¿èÛ×êßìÛ ¿åããåäé ½êêèßØëêßåä ! ÅäêÛèä×êßåä×â ¦¿¿ ¾Õ ! § âßÙÛä

ÂÅÃÑÎÁ

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&&$ 6WXG\ $UHD

3ODQQLQJ $SSOLFDWLRQV :LFNORZ &RXQW\ &RXQFLO

- ● *UDQWHG
- ○ 5HIXVHG
- ○ /LYH

/DQG 8VH =RQLQJV :LFNORZ

3'$ 3ULPDU\ 'HYHORSPHQW $

6'$ 6HFRQGDU\ 'HYHORSPHQ

7'$ 7HUWLDU\ 'HYHORSPHQW

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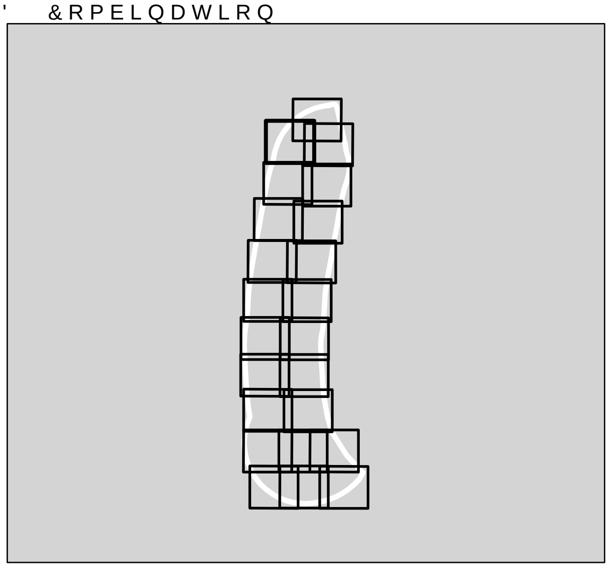
% :DYH
& 7LGDO
' &RPELQDWLRQ



Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		Ìëèæåéû åü èûìßéßåä	Àè×í	ä¿ÞÛÙ	áÎŴì	Ú½ææè Ú

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ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ùåã

ÌèåàÛÙê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ ÐßêâÛ

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¿¿½# Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×ä
¦Ì×ÝÛ åÜ §

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

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õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ ÈßãßêÛÚ
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íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ×
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Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßéééëÛÚ ßä ×ÙÙåèÚ
ØÛêíÛÛä Æ×ÙåØé ×äÚ êÞÛ ¿âßÛäê Æ×ÙåØé ×ÙÙÛæêé äå âß×Ø
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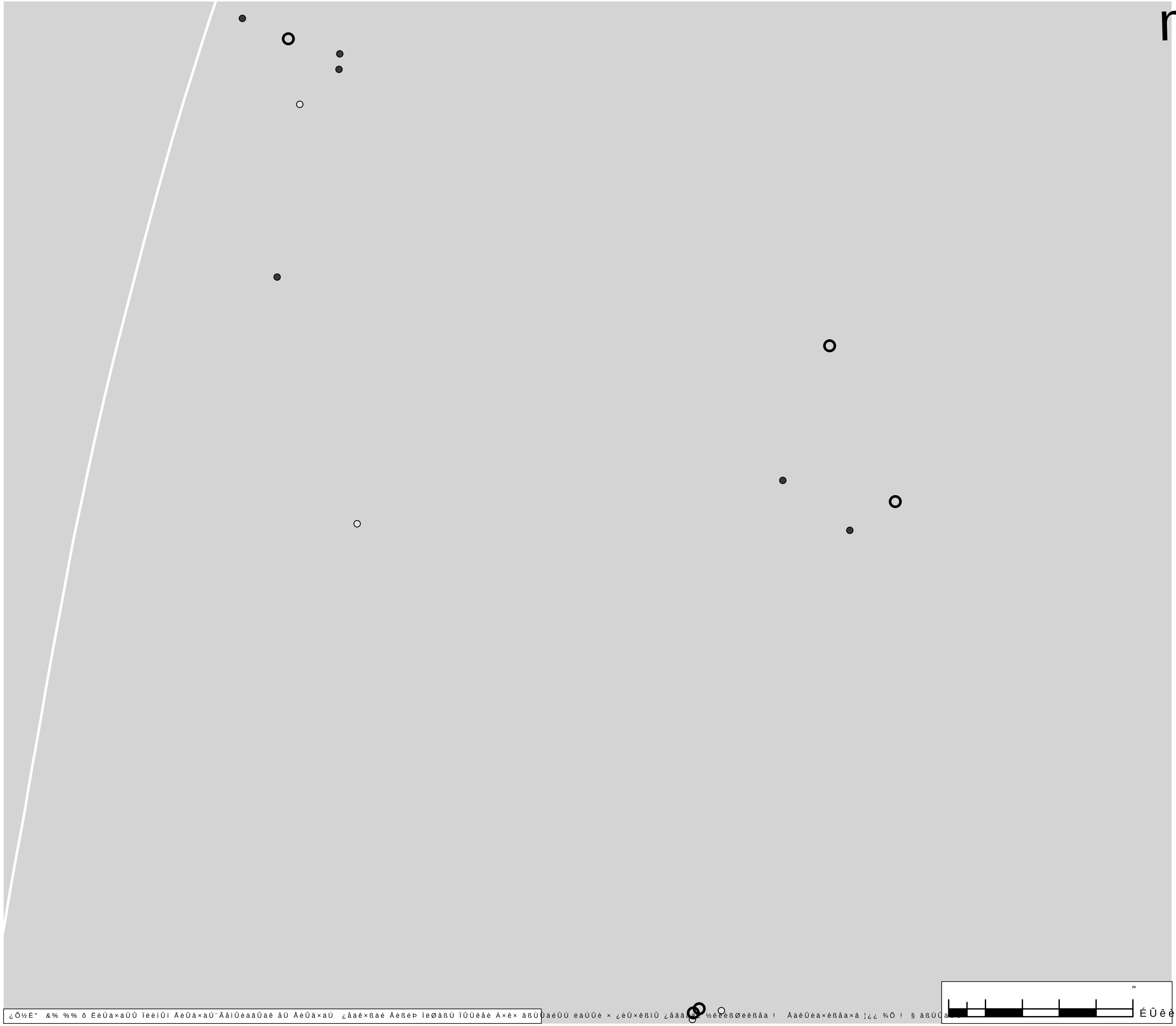
Ì×êÞ ©©ÝØâåä ìé ©ÃÅÏÌèåàÛÙêé©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥ÁäìßèåääãÛäê×â¥¿åäéêè×ßäêé¥ÎÛæåèê©



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ÂÅÃÑÎÁ

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/DQG 8VH =RQLQJV :LFNORZ

3ODQQLQJ $SSOLFDWLRQV :LFNORZ &RXQW\ &RXQFLO

● *UDQWHG

○ 5HIXVHG

○ /LYH

3'$ 3ULPDU\ 'HYHORSPHQW $

6'$ 6HFRQGDU\ 'HYHORSPHQW

7'$ 7HUWLDU\ 'HYHORSPHQW

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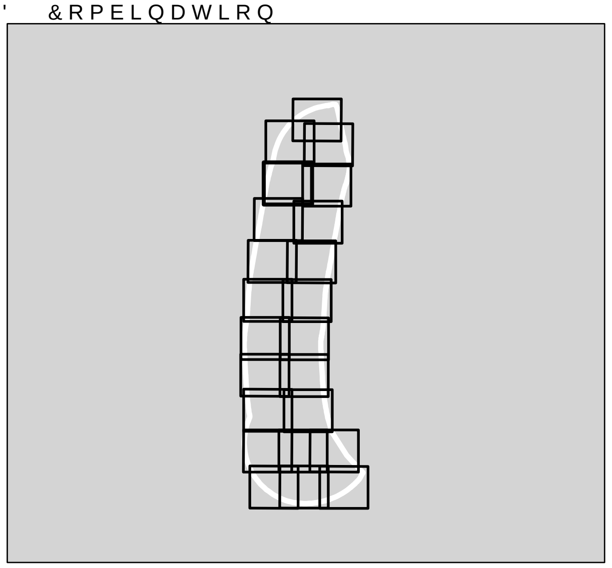
% :DYH
& 7LGDO
' &RPELQDWLRQ



Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		Ìëèæåé Û åÜ èÛìßéßåä	Àè×íä	¿Þ ÛÙáÎ	Ûì	Ú½ææè Ú

¿âßÛäê

ÀÛéßÝäÛè

ÉÛèèßåä ÄåëéÛ ÉÛèèßåä ÎÚ ÀëØâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ùåã

ÌèåàÛÙê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ Ðßêâ

ÂßÝëèÛ
¿¿½# Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×ä
¦Ì×ÝÛ ! åÜ §

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

Ïê×êÛ ¿åÚÛ	ÌÞ×éÛ		
ÏÙ×âÛ Ž ½	"	ÀË ÊËÐ Ï¿½ÈÁ	
Æ×ÙåØé Êå	À #"%	ÎÛì	Ò
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õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ ÈßãßêÛÚ
ÙåäêÛ×ßäÛÚ ßä êÞßé ÚåÙëãÛäê ×èÛ êÞÛ æèåæÛèêï åÜ Æ×ÙåØ
íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ×
ÙåæïèßÝÞê Èßãßê×êßåä ÐÞßé Úè×íßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ
Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßééëÛÚ ßä ×ÙÙåèÚ
ØÛêíÛÛä Æ×ÙåØé ×äÚ êÞÛ ¿âßÛäê Æ×ÙåØé ×ÙÙÛæêé äå âß×Ø
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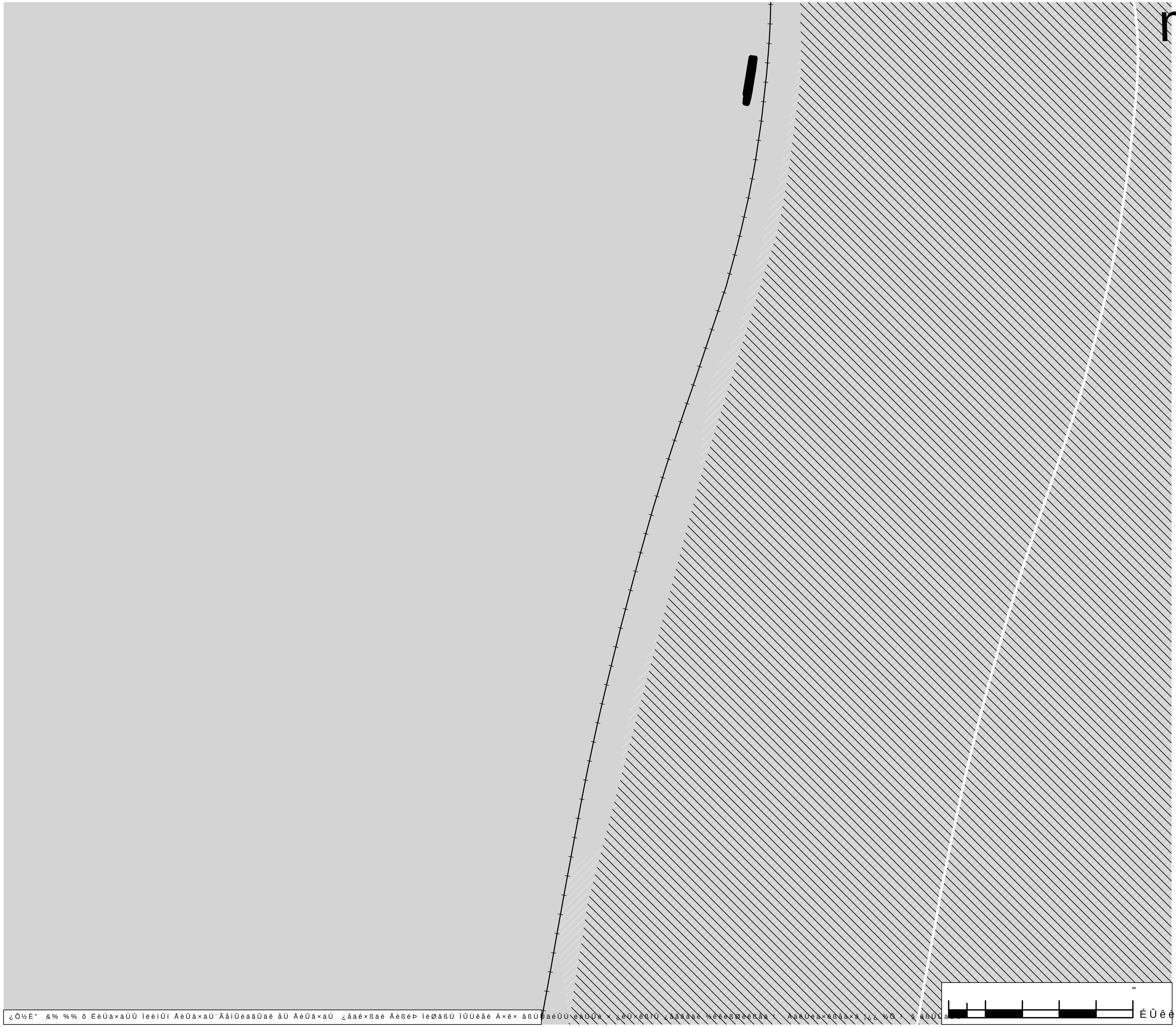
Ì×êÞ ©©ÝØåää ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥ÁäìßèåäãÛäê×â¥¿åäéêè×ßäêé¥ÎÛæåèê©



ÂÅÃÑÎÁ

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5DLOZD\ 1HWZRUN &HQWUHOLQH

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'+/*+)RUHVKRUH 2IIVKRUH 5HQHZDEOH (QHUJ\ 'DWD

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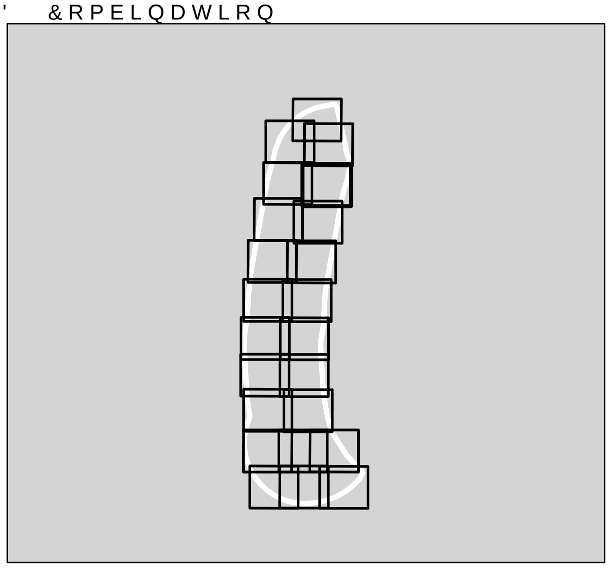

Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		Ìëèæåé Û åÜ èÛìßéßåä	Àè×í	¿ÞÛÙ	áÎÛì	Ú½ææèÚ

¿âßÛäê

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ÉÛèèßåä ÄåëéÛ ÉÛèèßåä ÎÚ Àëøâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ùåã

ÌèåàÛÙê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ ÐßêâÛ

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¿¿½# Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×ä
¦Ì×ÝÛ " åÜ §

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

Ïê×êÛ ¿åÚÛ	ÌÞ×éÛ		
ÏÙ×âÛ Ž ½	"	ÀË ÊËÐ Ï¿½ÈÁ	
Æ×ÙåØé Êå	À #"%	ÎÛì	Ò
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õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ ÈßãßêÛÚ
ÙåäêÛ×ßäÛÚ ßä êÞßé ÚåÙëãÛäê ×èÛ êÞÛ æèåæÛèêï åÜ Æ×Ùå
íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ×
ÙåæïèßÝÞê ÈßãßêÛÚ ÐÞßé ÚèÛíßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ
Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßééëÛÚ ßä ×ÙÙåèÚ
ØÛêíÛÛä Æ×ÙåØé ×äÚ êÞÛ ¿âßÛäê Æ×ÙåØé ×ÙÙÛæêé äå âß×Ø
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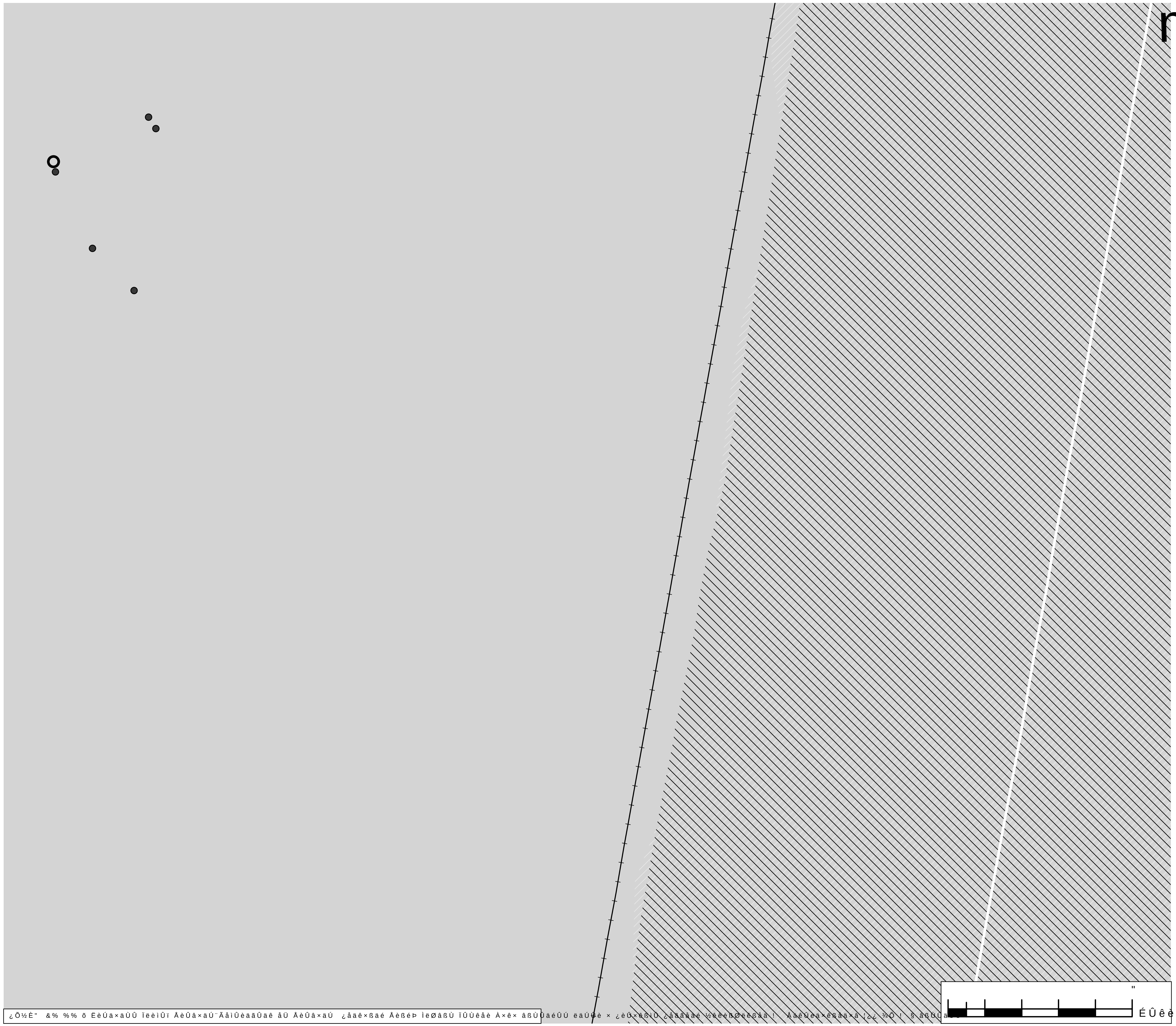
Ì×êÞ ©©ÝØâåä ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥ÁäìßèåäãÛäê×â¥¿åäéêè×ßäêé¥ÎÛæåèê© ¥Å



¿Õ½È" &% %% õ ËèÚä×äÙÛ ÏëèìÛï ÅèÛâ×äÚ¨ÃåìÛèäãÛäê åÜ ÅèÛâ×äÚ ¿åäê×ßäé ÅèßéÞ ÌëØâßÙ ÏÛÙêåè À×ê× âßÙÛäéÛÚ

ÂÅÃÑÎÁ

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⊣⊢ 5DLOZD\ 1HWZRUN &HQWUHOLQH

3ODQQLQJ $SSOLFDWLRQV :LFNORZ &RXQW\ &RXQFLO

● *UDQWHG

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'+/*+)RUHVKRUH 2IIVKRUH 5HQHZDEOH (QHUJ\ 'DWD

▨ $SSOLHG

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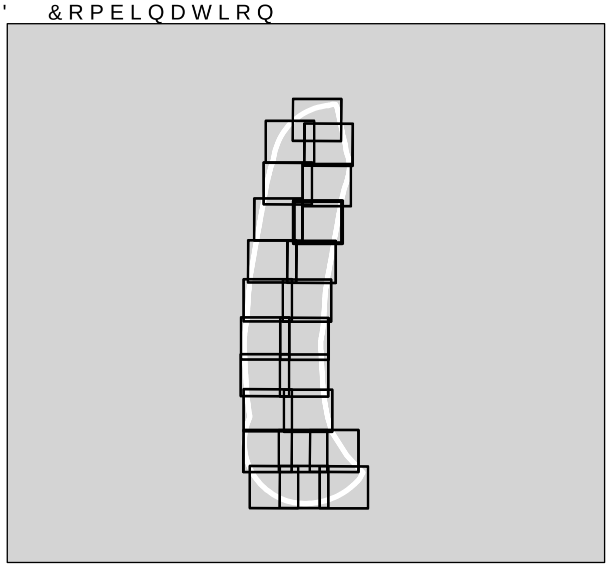

Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		Ìëèæåé Û åÜ èÛìßéßåä	Àè×íä	¿ÞÛÙ	áÎ₩ì	Ú½ææè Ú

¿âßÛäê

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ÉÛèèßåä ÄåëéÛ ÉÛèèßåä ÎÚ ÀëØâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ùåã

ÌèåàÛÙê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ Ðßêâ Û
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¿¿½# Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×ä
¦Ì×ÝÛ # åÜ §

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

Ïê×êÛ ¿åÚÛ	ÌÞ×éÛ	
ÏÙ×âÛ Ž ½	"	ÀË ÊËÐ Ï¿½ÈÁ
Æ×ÙåØé Êå	À #"%	ÎÛì Ò
¿âßÛäê Êå	% &	
Àè×íßäÝ Êå	&&$ B 3 ':* (9 -$&	

õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ Èßãßê ÛÚ ÙåäéÛÚ ßä êÞßé ÚåÙëãÛäê ×èÛ êÞÛ æèåæÛèêï åÜ Æ×ÙåØ íÞååâ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ× ÙåæïèßÝÞê ÈßãßêÛ×êßåä ÐÞßé ÚèÛíßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßéééëÛÚ ßä ×ÙÙåèÚ ØÛêíÛÛä Æ×ÙåØé ×äÚ êÞÛ ¿âßÛäê Æ×ÙåØé ×ÙÙÛæêé äå âß×Ø èÛéæåÛÙê åÜ ×äï ëéÛ åÜ åè èÛâß×äÙÛ ëæåä êÞßé ÚèÛíßäÝ Øï

Ì×êÞ ©©ÝØâåä ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥Áäìßèåää ãÛäê×â¥¿åäéêè×ßäêé¥ÎÛæåèêé©

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ÂÅÃÑÎÁ

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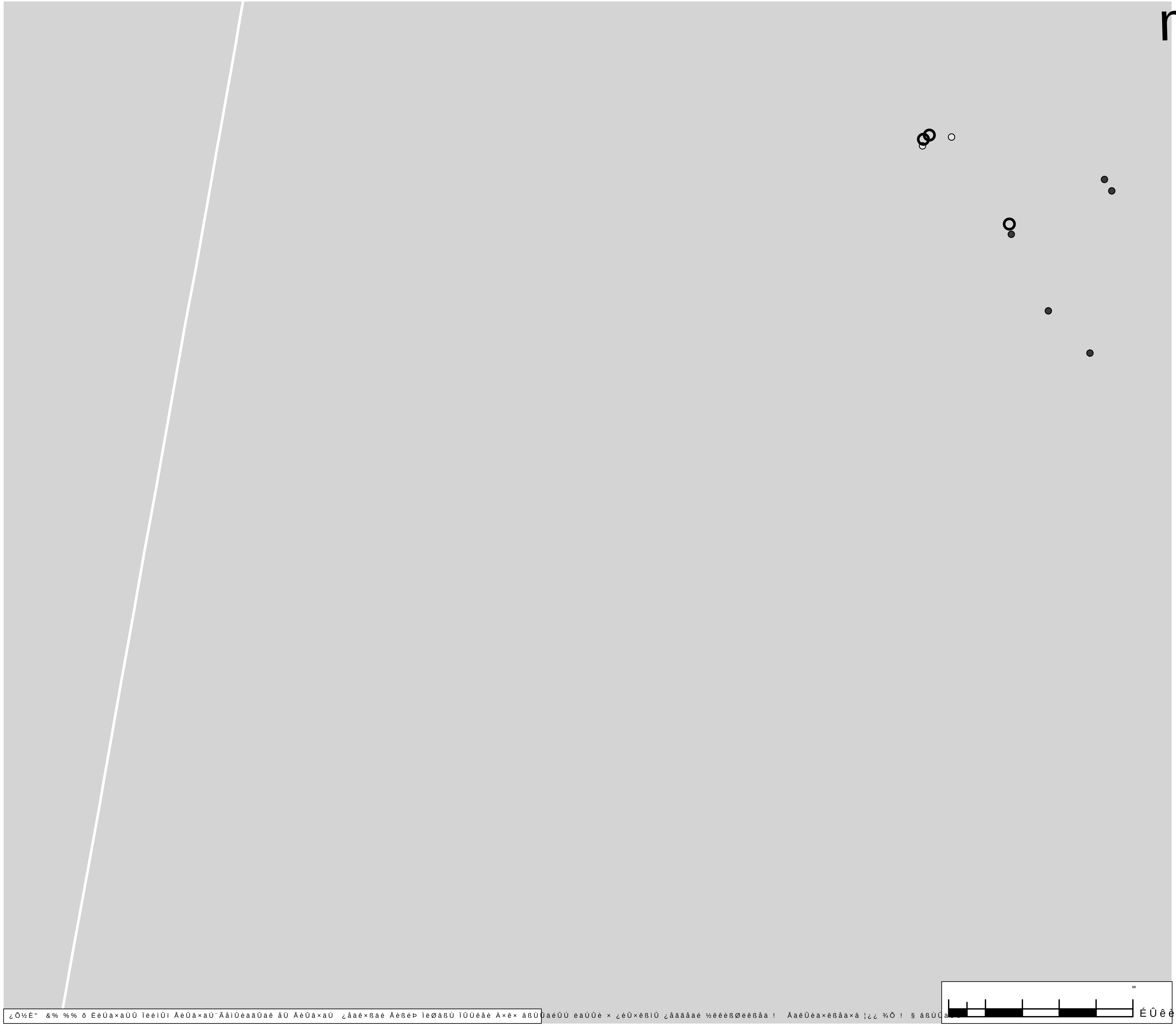
3ODQQLQJ $SSOLFDWLRQV :LFNORZ &RXQW\ &RXQFLO

- ● *UDQWHG
- ○ 5HIXVHG
- ○ /LYH



5HIHUHQFH IRU '+/*+

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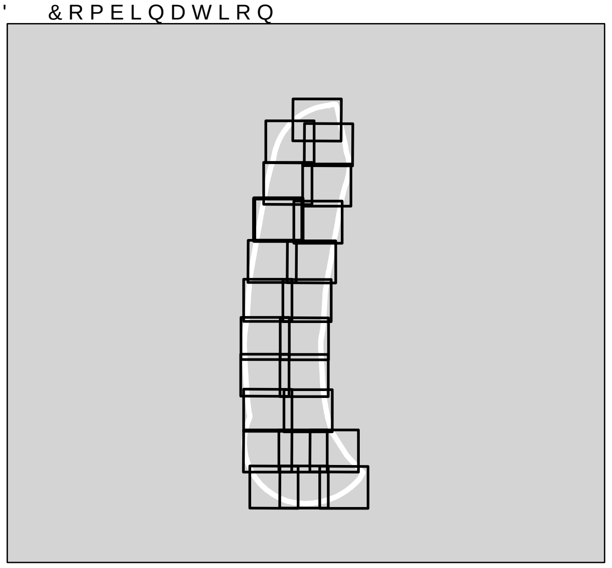
& 7LGDO
' &RPELQDWLRQ



Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		Ìëèæåéû åÜ èÛìßéßåä	Àè×íä¿	ÞÛÙ	áÎŴì	Ú½ææè Ú

¿âßÛäê

ÀÛéßÝäÛè

ÉÛèèßåä Äåëéû ÉÛèèßåä ÎÚ ÀëØâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ùåã

Ìèåàûùê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ Ðßêâû

ÂßÝëèÛ
¿¿½# Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×ä
¦Ì×ÝÛ $ åÜ §

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

Ïê×êÛ ¿åÚÛ	ÌÞ×éÛ	
ÏÙ×âÛ Ž ½	"	ÀË ÊËÐ Ï¿½ÈÁ
Æ×ÙåØé Êå	À #"%	ÎÛì Ò
¿âßÛäê Êå	% &	
Àè×íßäÝ Êå	&&$ B 3 ':* (9 -$&	

õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ Èßãßê Ú
Ùåäê×ßäÛÚ ßä êÞßé ÚåÙëãÛäê ×èÛ êÞÛ æèåæÛèêï åÜ Æ×ÙåØé
íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ×
ÙåæïèßÝÞê ÈßãßêÛêßåä ÐÞßé Úè×íßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ
Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßééëÛÚ ßä ×ÙÙåèÚ
ØÛêíÛÛä Æ×ÙåØé ×äÚ êÞÛ ¿âßÛäê Æ×ÙåØé ×ÙÙÛæêé äå âß×Ø
èÛéæÛÙê åÜ ×äï ëéÛ åÜ åè èÛâß×äÙÛ ëæåä êÞßé Úè×íßäÝ Øï

Ì×êÞ ©©ÝØâåä ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥Áäìßèåää ãÛäê×â¥¿åäéêè×ßäêé¥ÎÛæåèê© ¥Å

¿Õ½È" &% %% õ ËèÚä×äÙÛ ÏëèìÛï ÅèÛâ×äÚ¨ÃåìÛèäãÛäê åÜ ÅèÛâ×äÚ ¿åäê×ßäé Åèßé Ìë Øâ ßÙ ÏÛÙêåè À×ê× âßÙÛäéÛÚ ëäÚÛè × ¿èÛ×êßìÛ ¿åããåäé ½êêèßØëêßåä ! ÅäêÛèä×êßåä×â ¦¿¿ ¾Õ ! § âßÙÛäéÛ

ÂÅÃÑÎÁ

/HJHQG

&&$ 6WXGB $UHD

3ODQQLQJ $SSOLFDWLRQV :LFNORZ &RXQW&RXQFLO

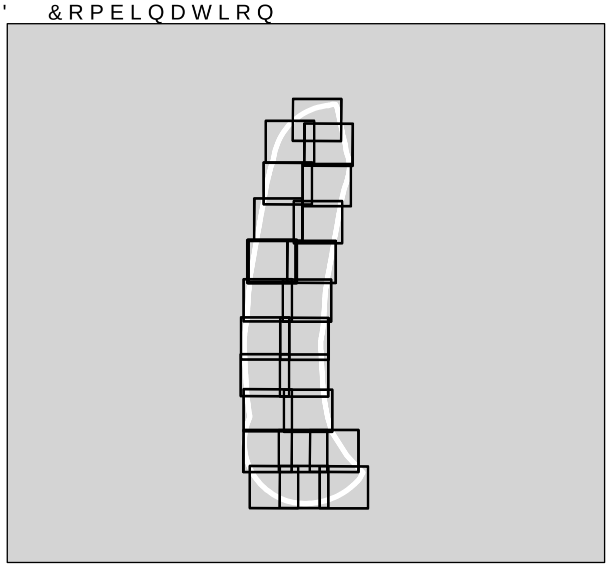
● *UDQWHG

○ 5HIXVHG

○ /LYH

5HIHUHQFH IRU '+/*+

$:LQG
% :DYH
& 7LGDO
' &RPELQDWLRQ



Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		ÌëèæåéÛ åÜ èÛìßéßåä	Àè×íä	¿ÞÛÙ	áÎÿì	Ú½ææè Ú

¿âßÛäê

ÀÛéßÝäÛè

ÉÛèèßåä ÄåëéÛ ÉÛèèßåä ÎÚ ÀëØâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ùåã

ÌèåàÛÙê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ ÐßêâÛ

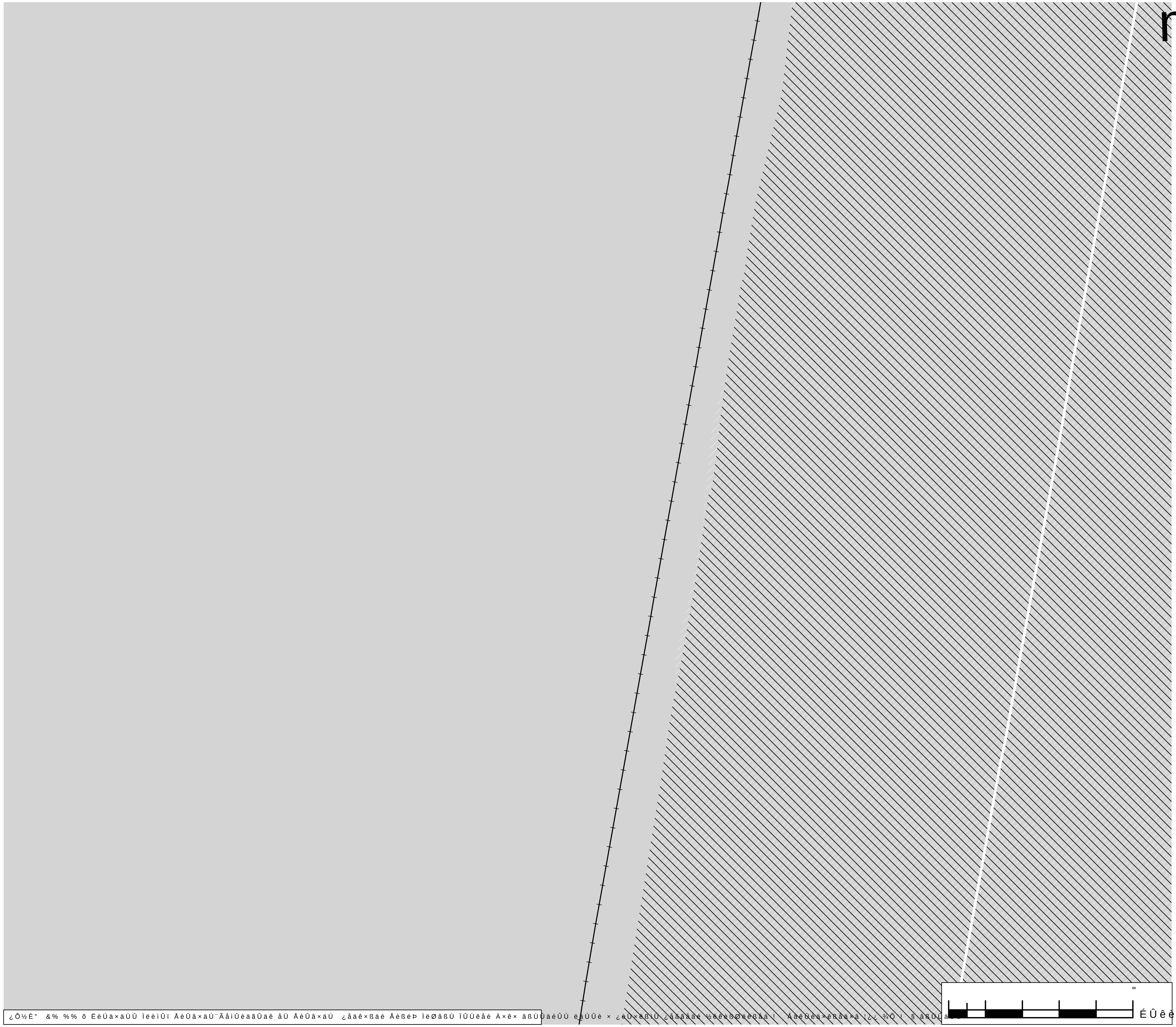
ÂßÝëèÛ
¿¿½# Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×ä
¦Ì×ÝÛ % åÜ §

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

Ïê×êÛ ¿åÚÛ	ÌÞ×éÛ		
ÏÙ×âÛ Ž ½	"	ÀË ÊËÐ Ï¿½ÈÁ	
Æ×ÙåØé Êå	À #"%	ÎÛì	Ò
¿âßÛäê Êå	% &		
Àè×íßäÝ Êå	&&$ B 3 ':* (9 -$&		

õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ Èßãßê
ÙåäêÛäêé ×äÚ ßä êÞßé ÚåÙëãÛäê ×èÛ êÞÛ æèåæÛèêï åÜ Æ×ÙåØ
íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ×
ÙåæïèßÝÞê Èßãßê×êßåä ÐÞßé ÚÛè×íßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ
Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßééëÛÚ ßä ×ÙÙåèÚ
ØÛêíÛÛä Æ×ÙåØé ×äÚ êÞÛ ¿âßÛäê Æ×ÙåØé ×ÙÙÛæêé äå âß×Ø
èÛéæÛÙê åÜ ×äï ëéÛ åÜ åè èÛâß×äÙÛ ëæåä êÞßé Úè×íßäÝ Øï

Ì×êÞ ©©ÝØâåå ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥ÁäìßèåäãÛäê×â¥¿åäéêè×ßäêé¥ÎÛæåèê©



ÂÅÃÑÎÁ

/HJHQG

&&$ 6WXG\ $UHD

5DLOZD\ 1HWZRUN &HQWUHOLQH

'+/*+)RUHVKRUH 2IIVKRUH 5HQHZDEOH (QHUJ\ 'DWD

▨ $SSOLHG

▨ 'HWHUPLQDWLRQ

&RQVXOWDWLRQ

5HIHUHQFH IRU '+/*+

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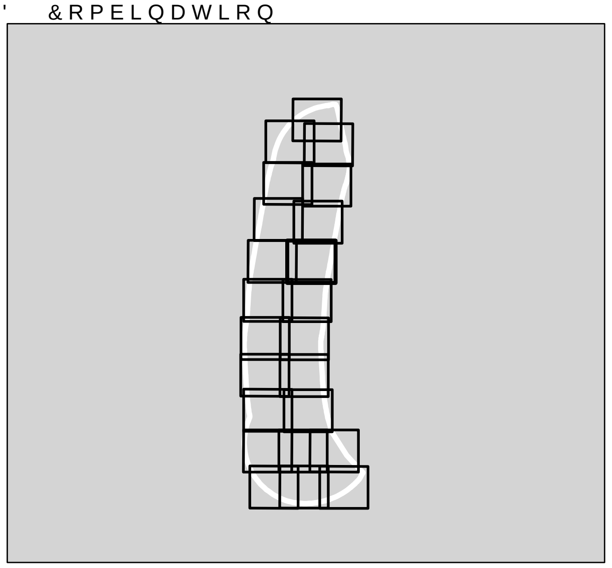
& 7LGDO
' &RPELQDWLRQ



Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		Ìëèæåé Û åÜ èÛìßéßåä	Àè×í	¿ÞÛÙ	âÎŴì	Ú½ææè Ú

¿âßÛäê

ÀÛéßÝäÛè

ÉÛèèßåä ÄåëéÛ ÉÛèèßåä ÎÚ ÀëØâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ùåã

Ìèåà ÛÙê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ Ðßêâ Û

ÂßÝëèÛ
¿¿½# Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×ä
¦Ì×ÝÛ & åÜ §

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

ÏêxêÛ ¿åÚÛ	ÌÞ×éÛ	
ÏÙ×âÛ Ž ½	"	ÀË ÊËÐ Ï¿½ÈÁ
Æ×ÙåØé Êå	À #"%	ÎÛì Ò
¿âßÛäê Êå	% &	
Àè×íßäÝ Êå	&&$ B 3 ':* (9 -$&	

õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ Èßãßê
ÙåäÚ×ßäÛÚ ßä êÞßé ÚåÙëãÛäê ×èÛ êÞÛ æèåæÛèêï åÜ Æ×ÙåØ
íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ×
ÙåæïèßÝÞê Èßãßê×êßåä ÐÞßé Úè×íßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ
Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßéééëÛÚ ßä ×ÙÙåèÚ
ØÛêíÛÛä Æ×ÙåØé ×äÚ êÞÛ ¿âßÛäê Æ×ÙåØé ×ÙÙÛæêé äå âß×Ø
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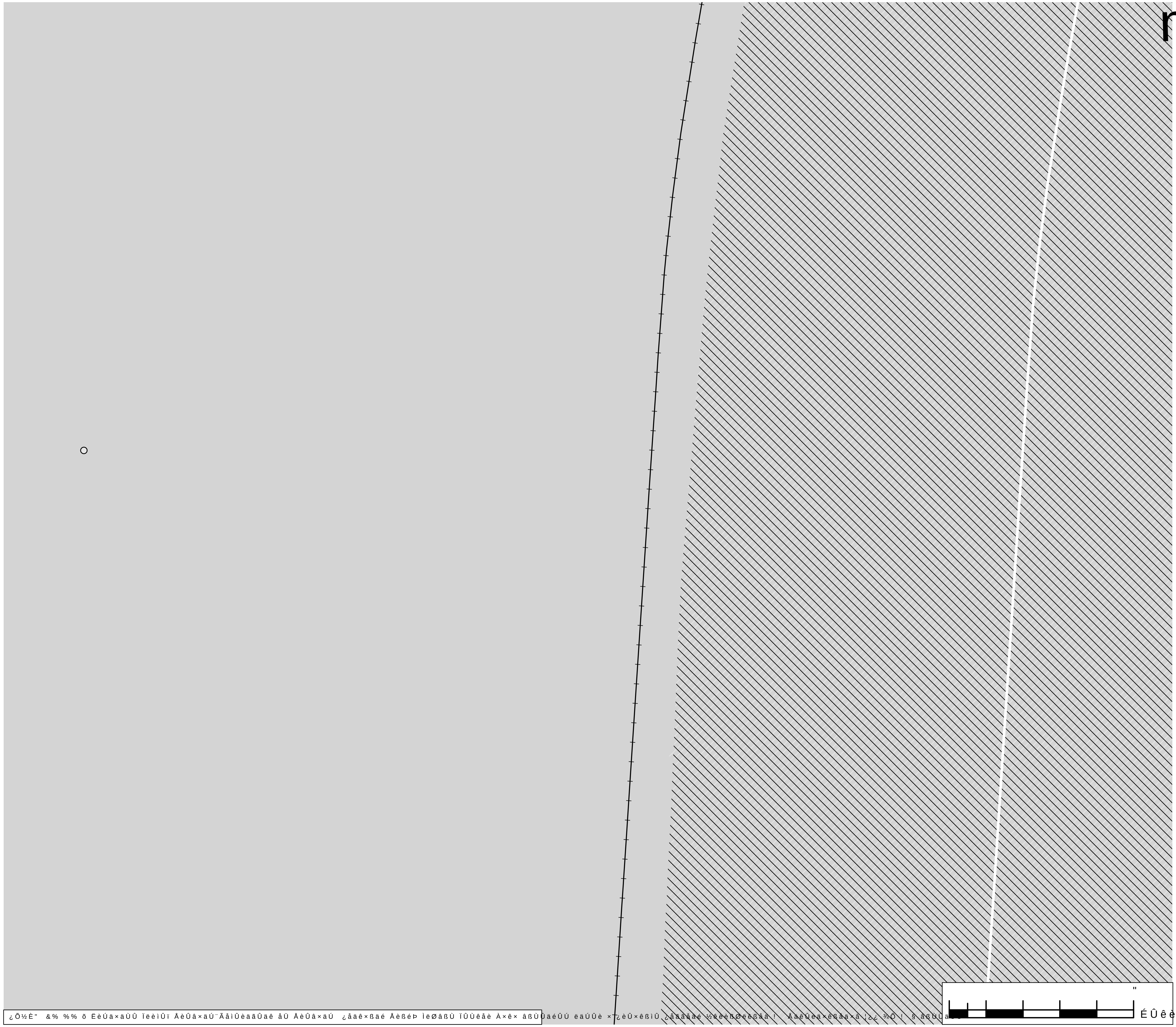

¿Õ½È" &% %% õ ËèÚä×äÙÛ Ïëèìûï ÅèÛâ×äÚ¨ÃåìÛèääÛäê åÜ ÅèÛâ×äÚ ¿åäê×ßäé ÅèßéÞ ÌëØâßÙ ÏÛÙêåè À×ê× âßÙÛäéÛÚ

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ÂÅÃÑÎÁ

/HJHQG

&&$ 6WXG\ $UHD

5DLOZD\ 1HWZRUN &HQWUHOLQH

3ODQQLQJ $SSOLFDWLRQV :LFNORZ &RXQW
&RXQFLO

○ 5HIXVHG

'+/*+)RUHVKRUH 2IIVKRUH 5HQHZDEOH
(QHUJ\ 'DWD

▧ $SSOLHG

▨ 'HWHUPLQDWLRQ

&RQVXOWDWLRQ

5HIHUHQFH IRU '+/*+

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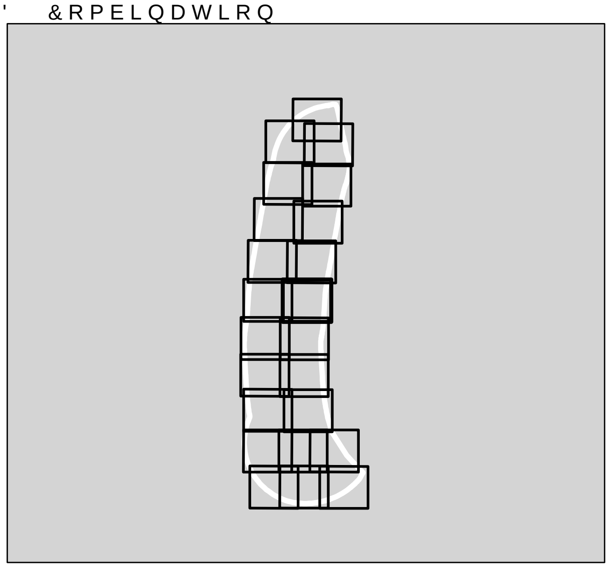
& 7LGDO
' &RPELQDWLRQ



Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		Ìëèæåé Û åÜ èÛìßéßåä	Àè×í	ä¿ÞÛÙ	áÎŴì	Ú½ææè Ú

¿âßÛäê

ÀÛéßÝäÛè

ÉÛèèßåä ÄåëéÛ ÉÛèèßåä ÎÚ Àëøâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ùåã

Ìèåàûùê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ Ðßêâû

ÂßÝëèÛ
¿¿½# Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×ä
¦Ì×ÝÛ åÜ §

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

Ïê×êÛ ¿åÚÛ	ÌÞ×éÛ		
ÏÙ×âÛ Ž ½	"	ÀË ÊËÐ Ï¿½ÈÁ	
Æ×ÙåØé Êå	À #"%	ÎÛì	Ò
¿âßÛäê Êå	% &		
Àè×íßäÝ Êå	&&$ B 3 ':* (9 -$&		

õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ ÈßãßêÛÚ
ÙåäÛê×ßäÛÚ ßä êÞßé ÚåÙëãÛäê ×èÛ êÞÛ æèåæÛèêï åÜ Æ×ÙåØé
íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ×
ÙåæïèßÝÞê Èßãßê×êßåä ÐÞßé Úè×íßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ
Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßéééëÛÚ ßä ×ÙÙåèÛ
ØÛêíÛÛä Æ×ÙåØé ×äÚ êÞÛ ¿âßÛäê Æ×ÙåØé ×ÙÙÛæêé äå âß×Ø
èÛéæÛÙê åÜ ×äï ëéÛ åÜ åè èÛâß×äÙÛ ëæåä êÞßé Úè×íßäÝ Øï

Ì×êÞ ©©ÝØâåä ìé ©ÃÅÏÌèåà©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥ÁäìßèåääãÛäê×â¥¿åäéêè×ßäêé¥ÎÛæåèê©

m

ÂÅÃÑÎÁ

/HJHQG

&&$ 6WXG\ $UHD

3ODQQLQJ $SSOLFDWLRQV :LFNORZ &RXQW\ &RXQFLO

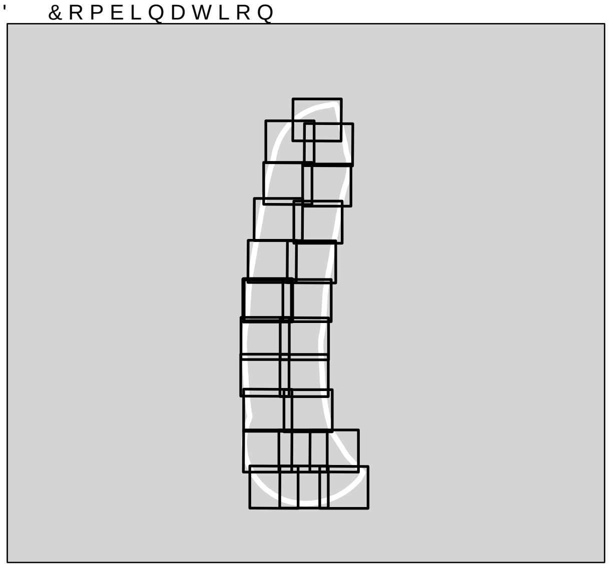
● *UDQWHG

○ 5HIXVHG

O /LYH

5HIHUHQFH IRU '+/*+

$:LQG
% :DYH
& 7LGDO
' &RPELQDWLRQ



Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		ÌëèæåéÛ åÜ èÛìßéßåä	Àè×íä	¿ÞÛÙáÛÚ	ÎÛì	Ú½ææèåìÛÚ

¿âßÛäê

ÀÛéßÝäÛè

ÉÛèèßåä ÄåëéÛ ÉÛèèßåä ÎÚ ÀëØâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ùåã

ÌèåàÛÙê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ ÐßêâÛ

ÂßÝëèÛ
¿¿½# Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×ä
¦Ì×ÝÛ åÜ §

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

Ïê×êÛ ¿åÚÛ	ÌÞ×éÛ		
ÏÙ×âÛ Ž ½	"	ÀË ÊËÐ Ï¿½ÈÁ	
Æ×ÙåØé Êå	À #"%	ÎÛì	Ò
¿âßÛäê Êå	% &		
Àè×íßäÝ Êå	&&$ B 3 ':* (9 -$&		

õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ ÈßãßêÛÚ ÙåäêÛ×ßäÛÚ ßä êÞßé ÚåÙëãÛäê ×èÛ êÞÛ æèåæÛèêï åÜ Æ×ÙåØé íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ×ÙåØé ÙåæïèßÝÞê ÈßãßêÛ×êßåä ÐÞßé ÚèÛíßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßéééëÛÚ ßä ×ÙÙåèÚ ØÛêíÛÛä Æ×ÙåØé ×äÚ êÞÛ ¿âßÛäê Æ×ÙåØé ×ÙÙÛæêé äå âß×Ø èÛéæåäÛÙÛ åÜ ×äï ëéÛ åÜ åè èÛâß×äÙÛ ëæåä êÞßé Úè×íßäÝ Øï

Ì×êÞ ©©ÝØåäà ìé ©ÃÅÏÌèåàÙÀ #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥ÁäìßèåäãÛäê×â¥¿åäéêè×ßäêé¥ÎÛæåèê©

¿Õ½Ë" &% %% ð ÊèÛâ×äÛÛ ÏëèìÛï ÅèÛâ×äÛ¨ÃâìÛèäâÛäê åÛ ÅèÛâ×äÛ ¿åâê×ßäé Âèßéé ÌëØâßÛ ÏÛÙêåè À×ê× âßÙÛäéÛÛ ëäÛÛè × ¿èÛ×êßìÛ ¿åääåäé ½êêèßØëêßåä ! ÅäêÛèä×êßåä×â ¦¿¿ ¾Õ ! § âßÙÛäéÛ

ÂÅÃÑÎÁ

/HJHQG

&&$ 6WXG\ $UHD

3ODQQLQJ $SSOLFDWLRQV :LFNORZ &RXQW\ &RXQFLO

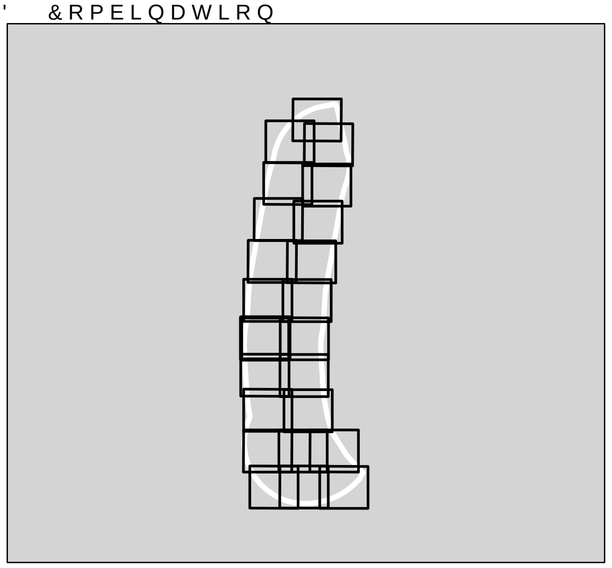
● *UDQWHG

○ 5HIXVHG

O /LYH

5HIHUHQFH IRU '+/*+

$:LQG
% :DYH
& 7LGDO
' &RPELQDWLRQ



Ò	Ë×è	!	ÂÈÎ ÏÁÒÂÁÒ	ÉÏ	ÏÏ	ÆÄ	ÀÇ
ÏÛì	À×êÛ		ÌèèæâèÛ åÛ èÛïßéßåä	Àè×ìä	¿ÞÛÙâÛî	½ææèå ÛÛ	

¿âßÛäê

ÀÛéßÝäÛè

ÉÛèèßâä ÄâëéÛ ÉÛèèßâä ÏÛ ÀèØâßä ! ÅèÛâ×äÛ À ! Ï ¿" ÐÛâ k " #&"###
ííí à×ÙÂØé ÛÂâ

ÌèåàÛÛê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÏÎËÐÁ¿ÐÅËÊ ÏÎËÆÁ¿

Àè×íßäÝ Ðßêâå

ÂßÝëèÛ
¿¿½# Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×ä
¦Ì×ÝÛ åÛ §

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

Ïë×âÛ ¿åÛÛ	ÏÞ×êÛ
ÏÛ×âÛ Ž ½	"
Æ×ÛÙéé Èä	À #"%
¿âßÛäê Èä	% &
Àè×íäÛ Èä	&&$ B 3 ':* (9 -$&

ÀË ÊËÐ ÏÀ½ÈÁ
ÏÛì
Ò

ð ¿åæïèßÝÞê Æ×ÙÂØé ÅäÝßäÛÛèßäÝ ÅèÛâ×äÛ ÊèßÙÛäÛé åÛ êÞÛé ÛåÙëÛÛäê åèÛ ×ÙÙÛæêÛÛ ØÛ êÞÛ ÛåâÛäê ...

ÂÅÃÑÎÁ

/HJHQG

&&$ 6WXG\ $UHD

⟞ 5DLOZD\ 1HWZRUN &HQWUHOLQH

■ 5LJKW RI :D\

3ODQQLQJ $SSOLFDWLRQV :LFNORZ &RXQ
&RXQFLO

○ 5HIXVHG

○ /LYH

'+/*+)RUHVKRUH 2IIVKRUH 5HQHZDEOH
(QHUJ\ 'DWD

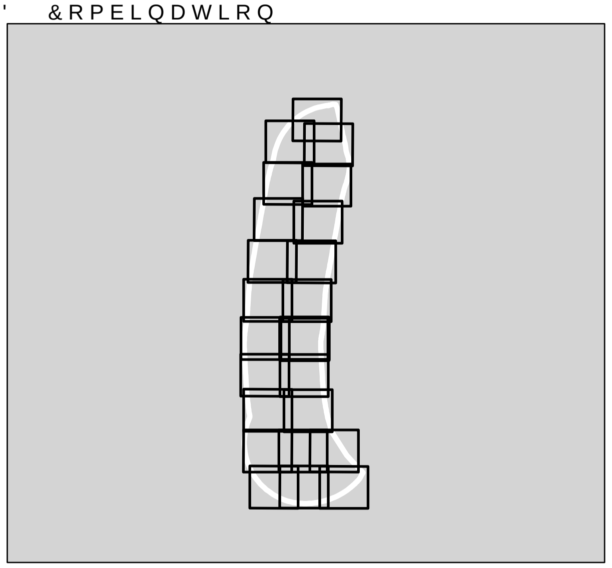
▨ $SSOLHG

▨ 'HWHUPLQDWLRQ

&RQVXOWDWLRQ

5HIHUHQFH IRU '+/*+

$:LQG
% :DYH
& 7LGDO
' &RPELQDWLRQ



Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
ÎÛì	À×êÛ		Ìëèæåéû åÜ èÛìßéßåä	Àè×íä	¿ÞÛÙ	áÎÛì	Û½ææè Ú

¿âßÛäê

ÀÛéßÝäÛè

ÉÛèèßåä ÄåëéÛ ÉÛèèßåä ÎÚ ÀëØâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ûåã

ÌèåàÛÙê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ ÐßêâÛ

ÂßÝëèÛ
¿¿½# Ÿ Ìâ×ääßäÝ ½ææâßÙ×êßåäé ×ä
¦Ì×ÝÛ åÜ §

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

Ïê×êÛ ¿åÚÛ	ÌÞ×éÛ		
ÏÙ×âÛ Ž ½	"	ÀË ÊËÐ Ï¿½ÈÁ	
Æ×ÙåØé Êå	À #"%	ÎÛì	Ò
¿âßÛäê Êå	% &		
Àè×íßäÝ Êå	&&$ B 3 ':* (9 -$&		

õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ ÈßãßêÛÚ
Ùåäê×ßäÛÚ ßä êÞßé ÚåÙëãÛäê ×èÛ êÞÛ æèåæÛèêï åÜ Æ×ÙåØ
íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ×
ÙåæïèßÝÞê ÈßãßÞ×êßåä ÐÞßé Úè×íßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ
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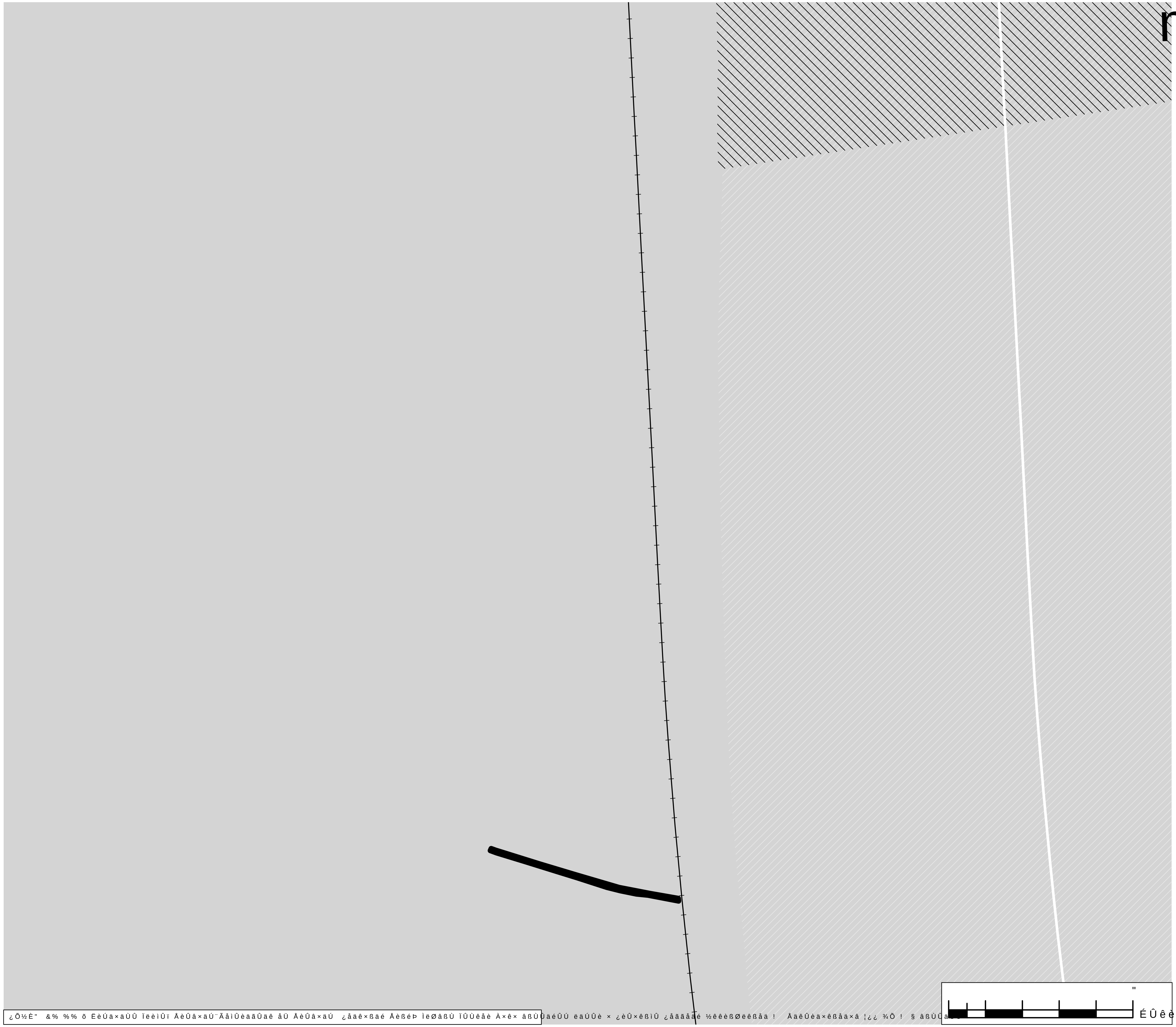

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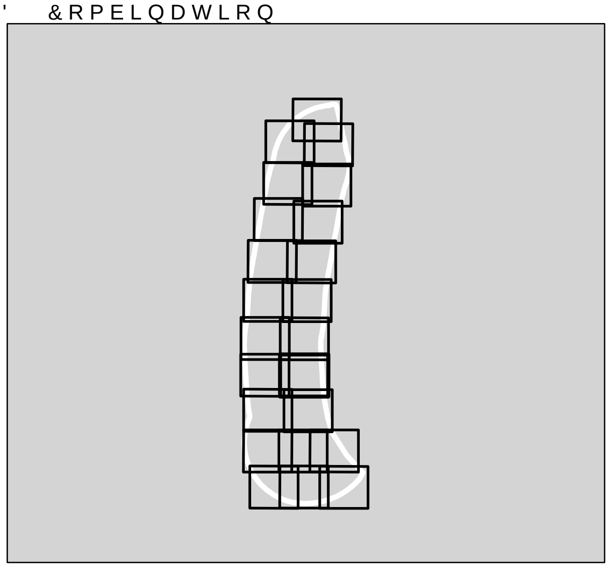

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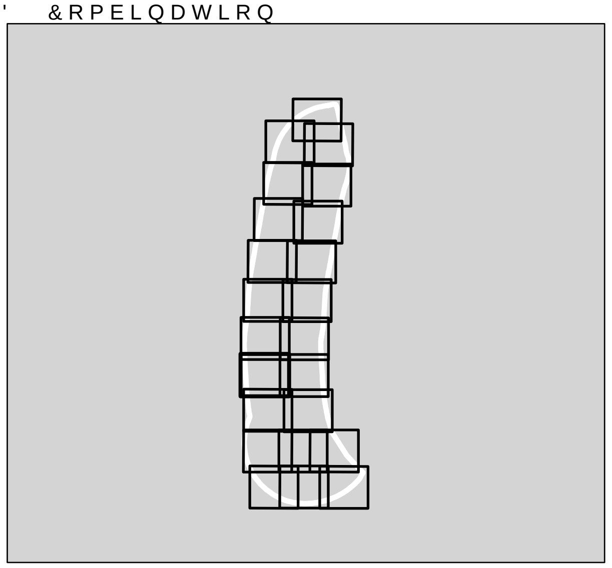

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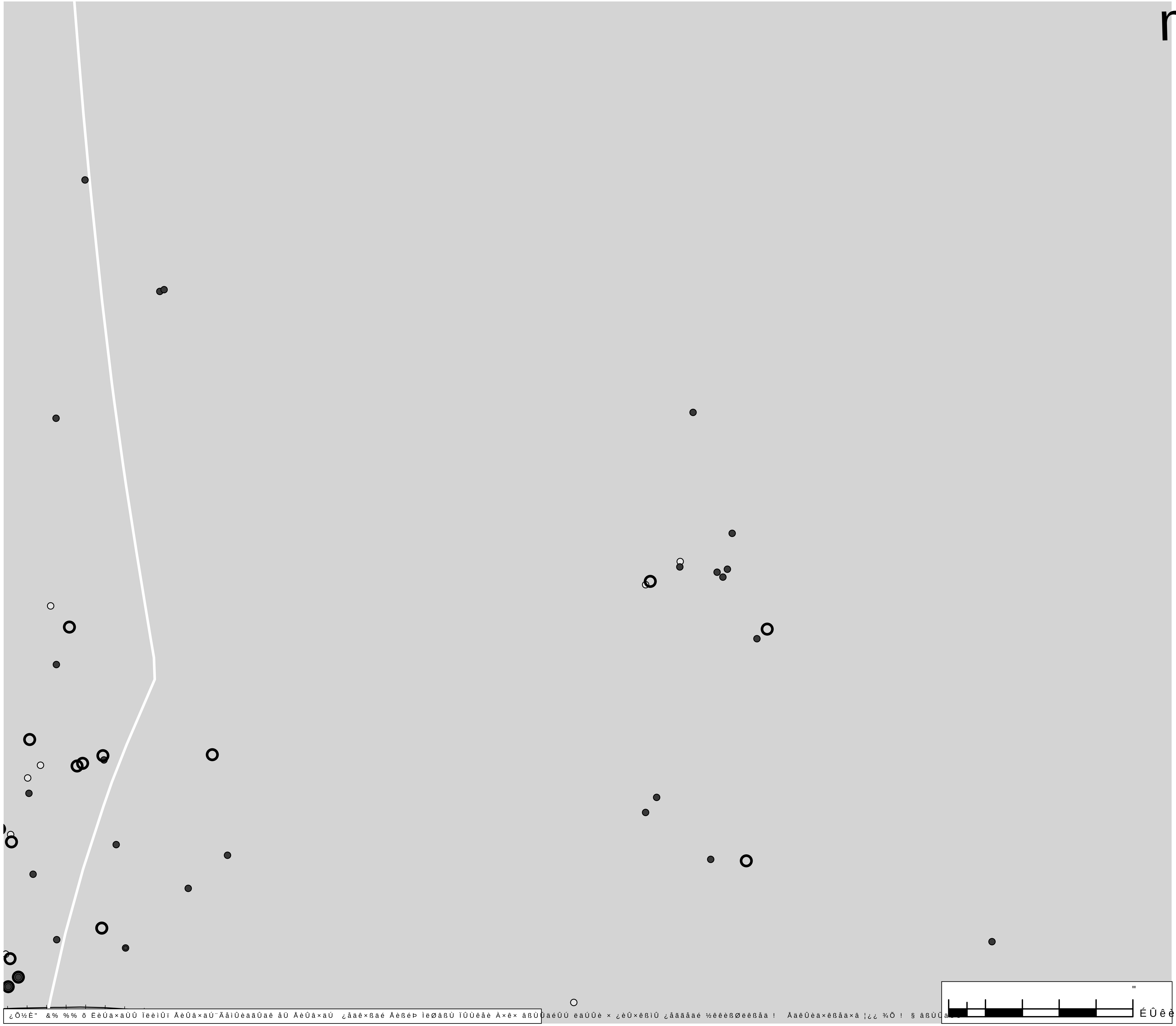

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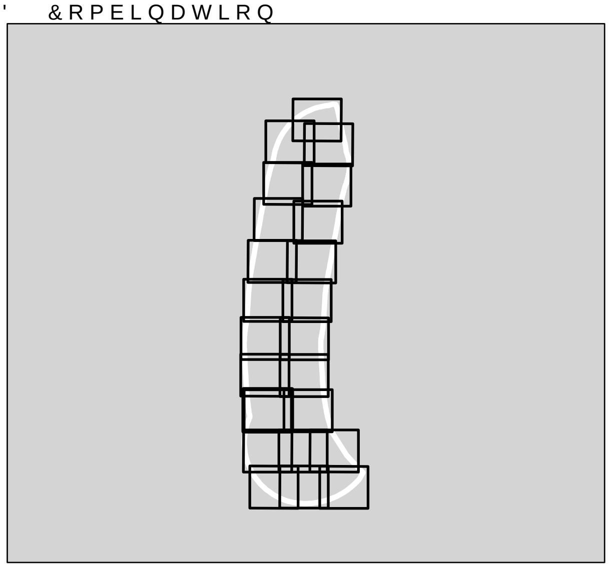

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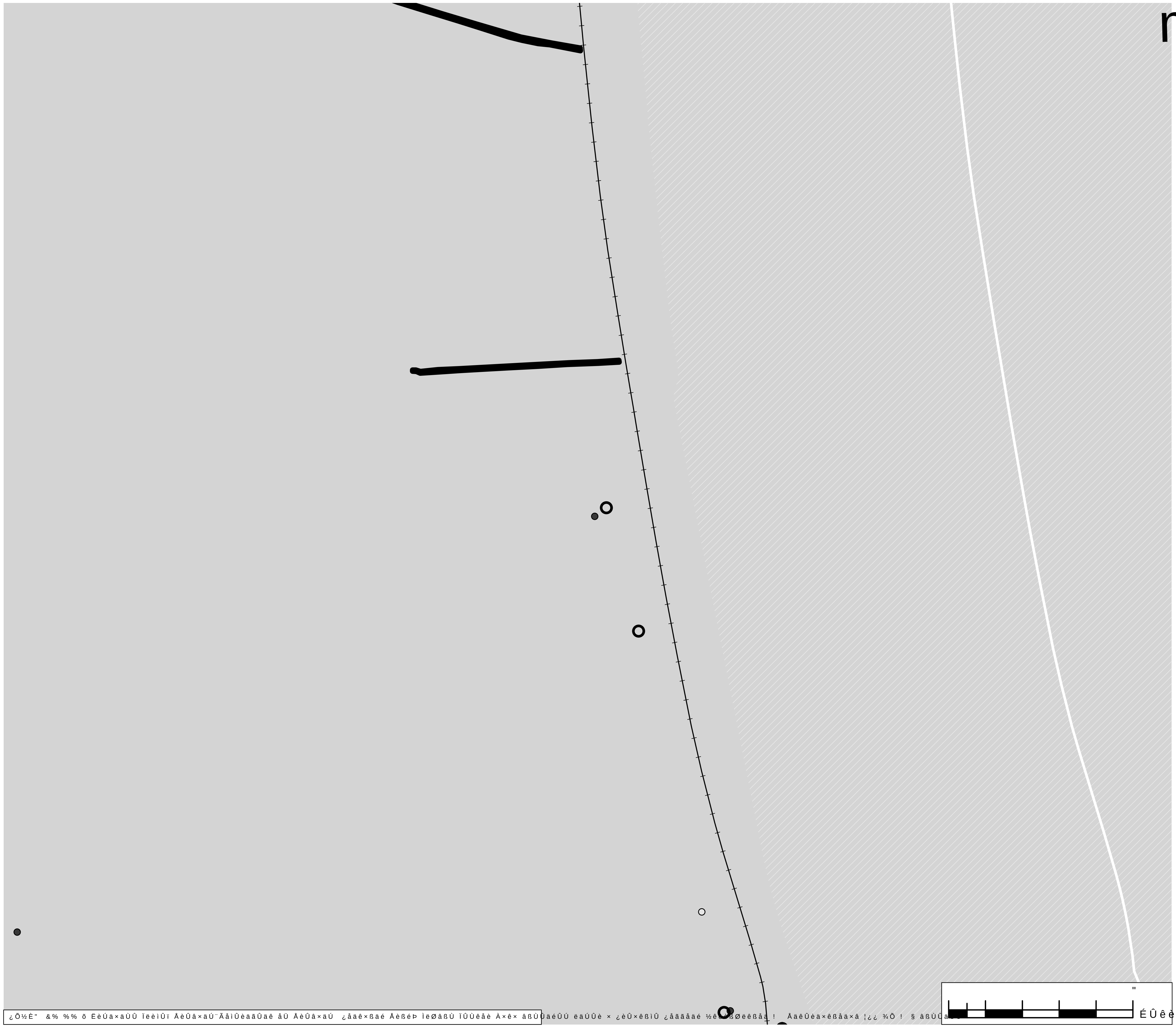

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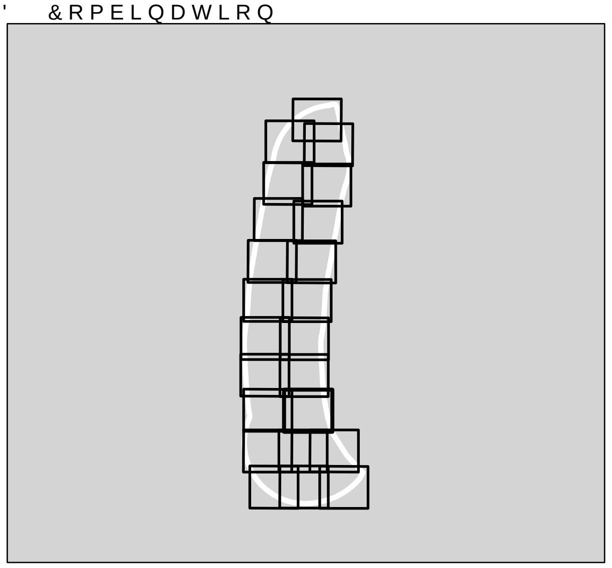

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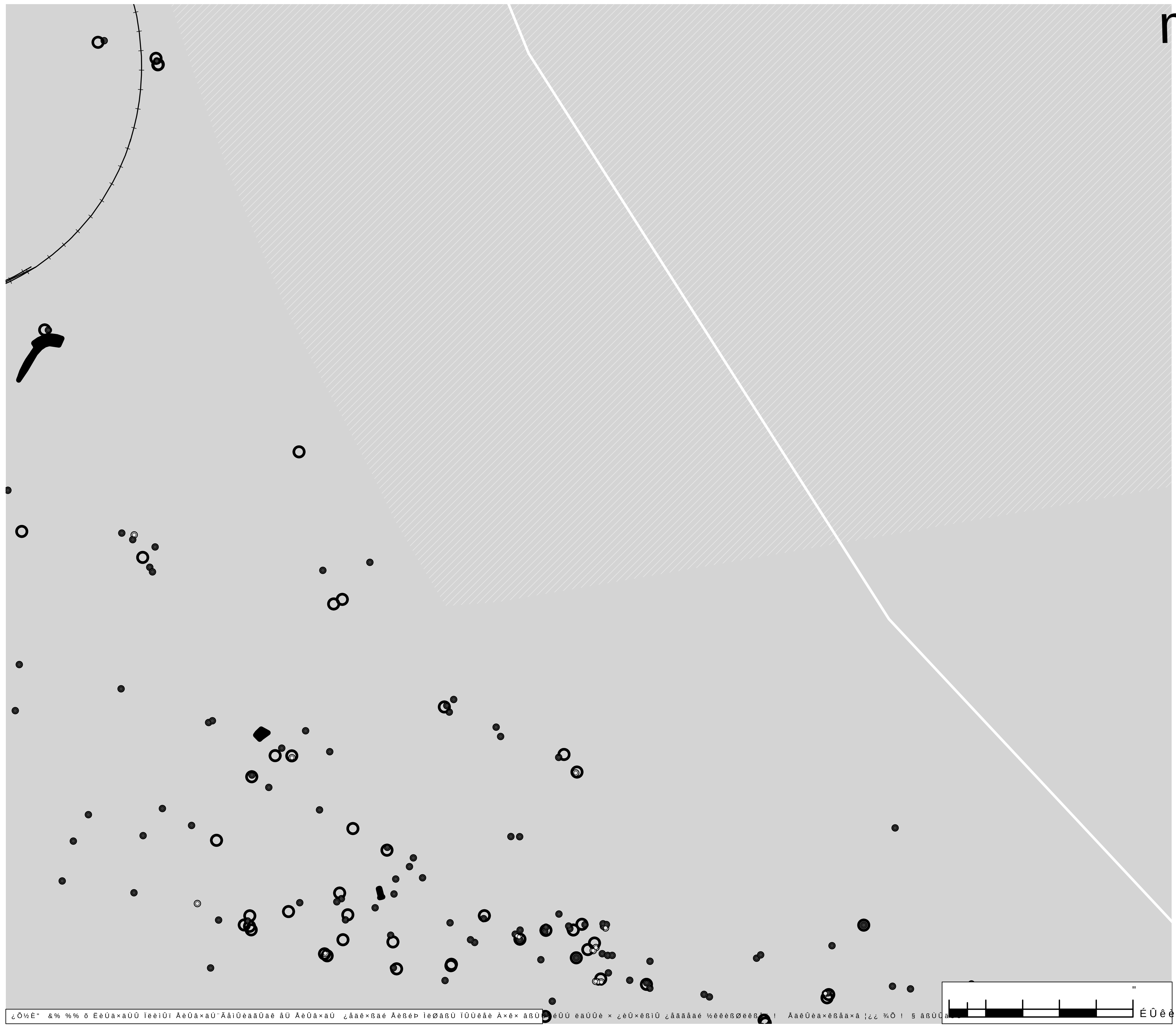

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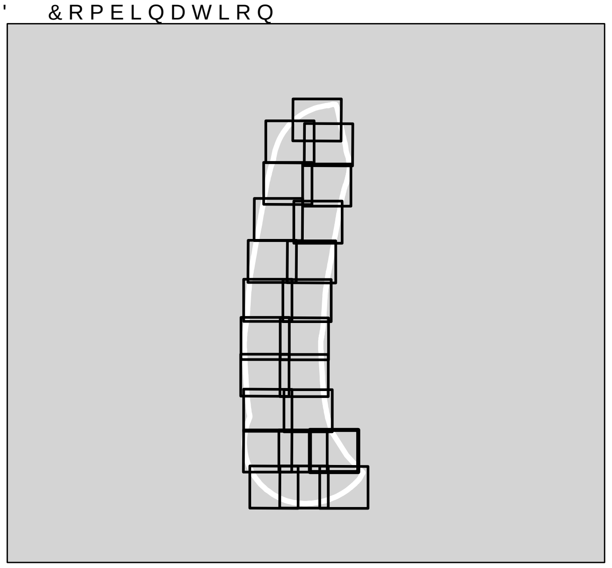

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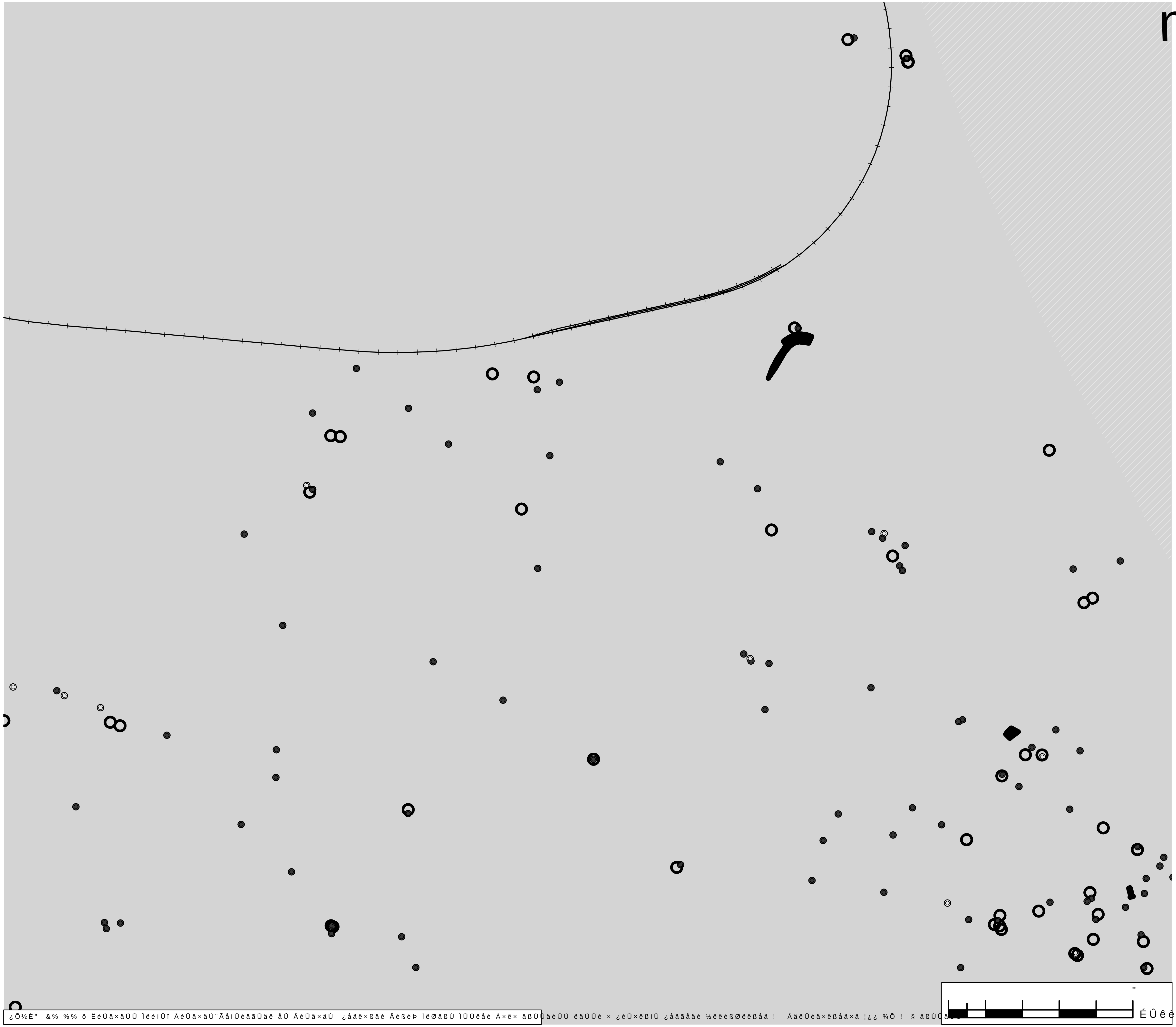

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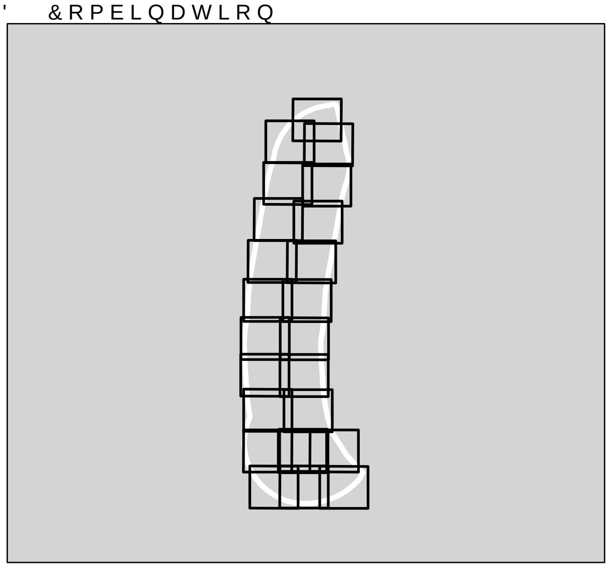

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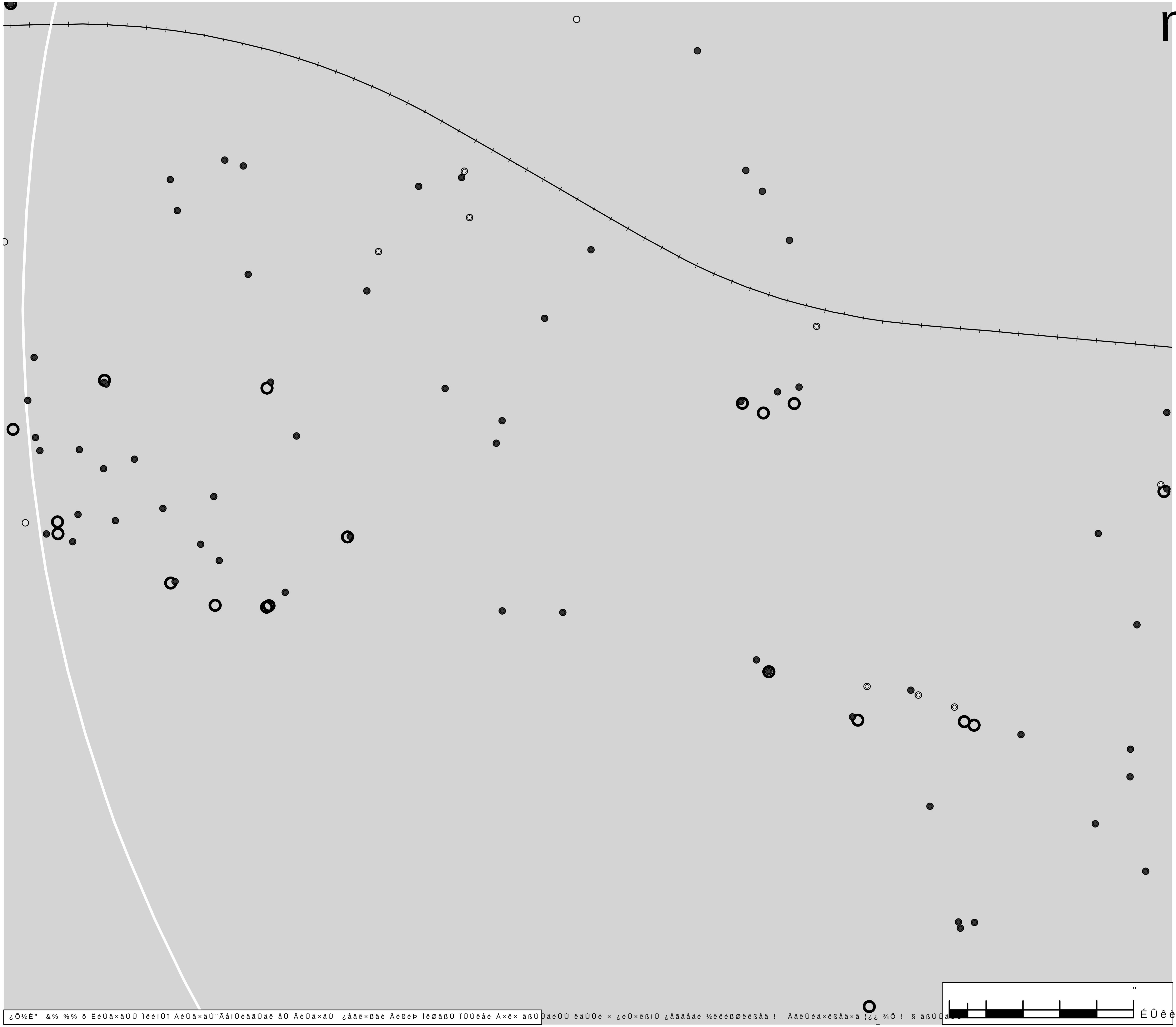

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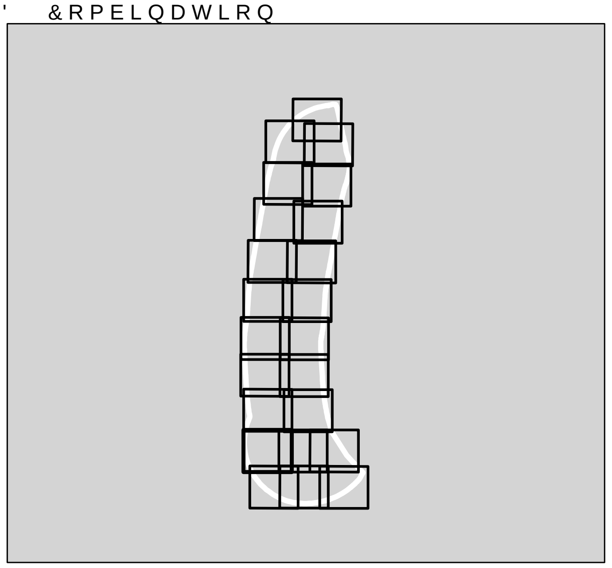

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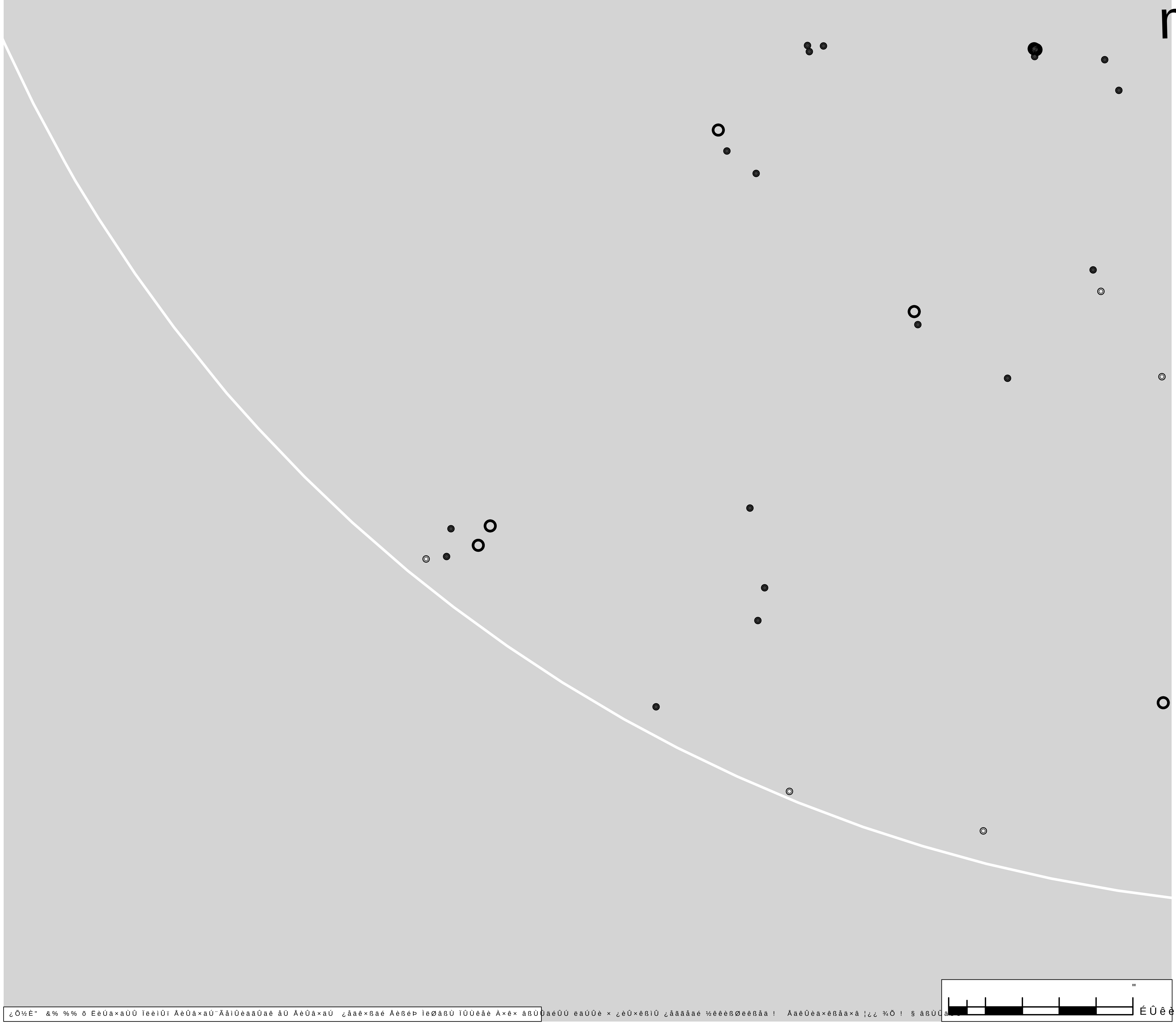

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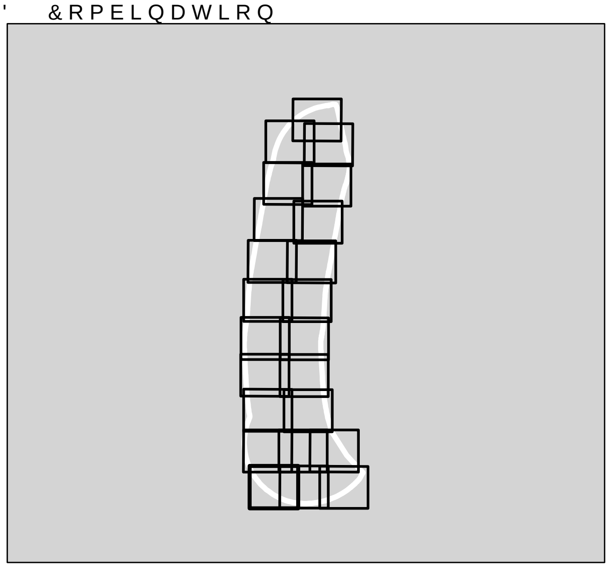

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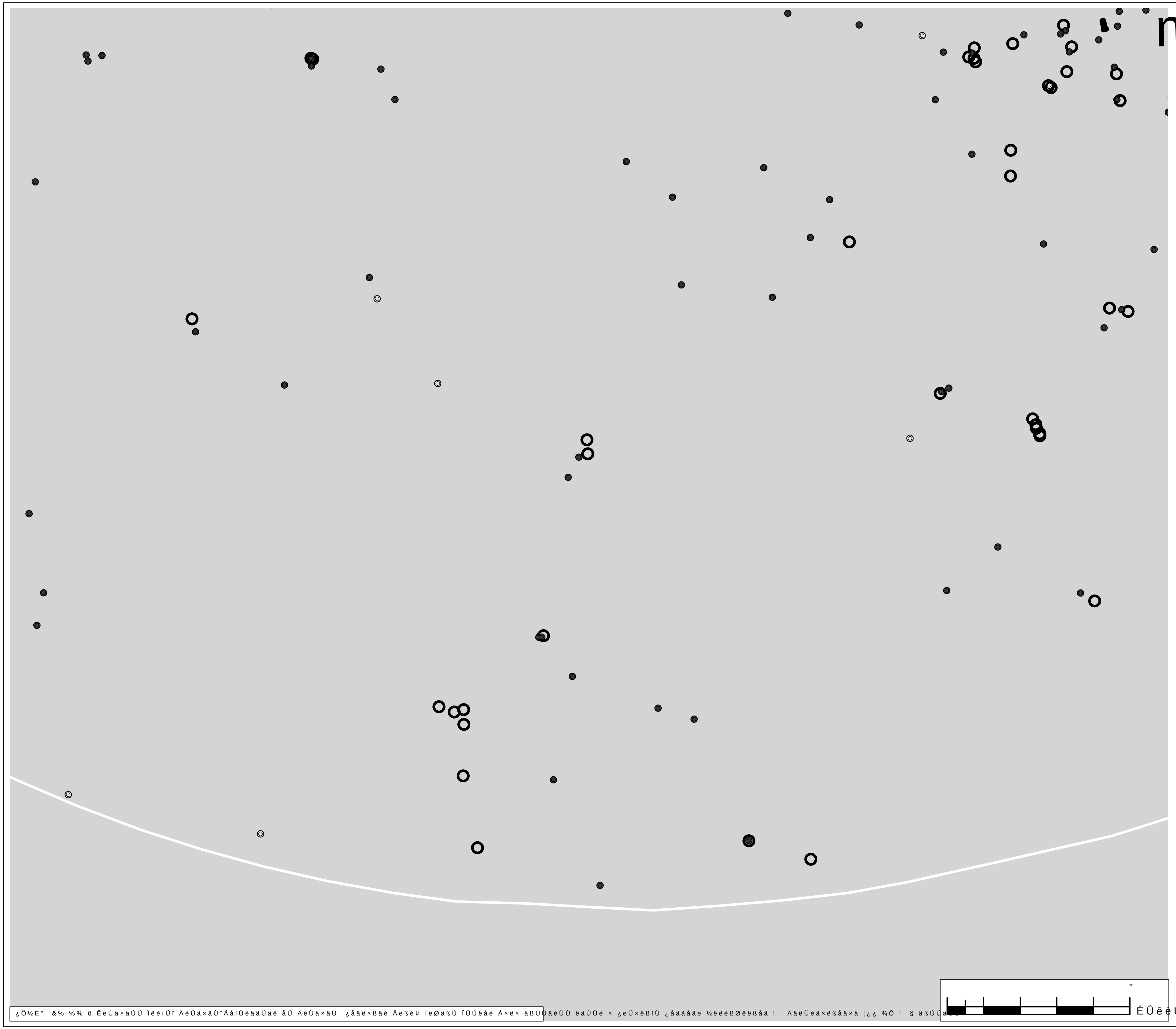

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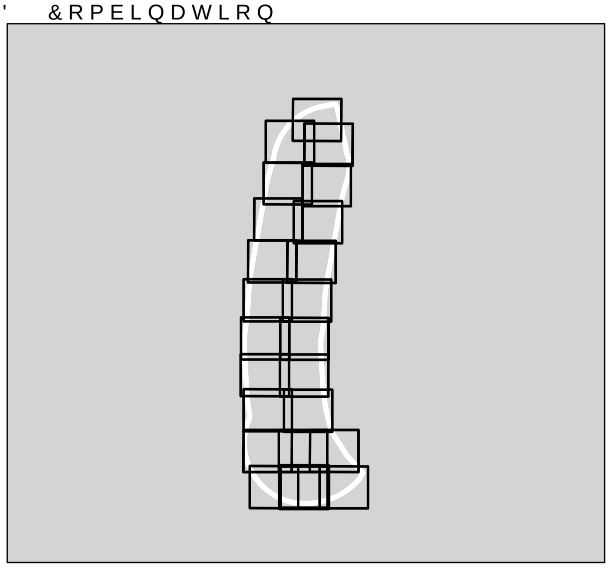

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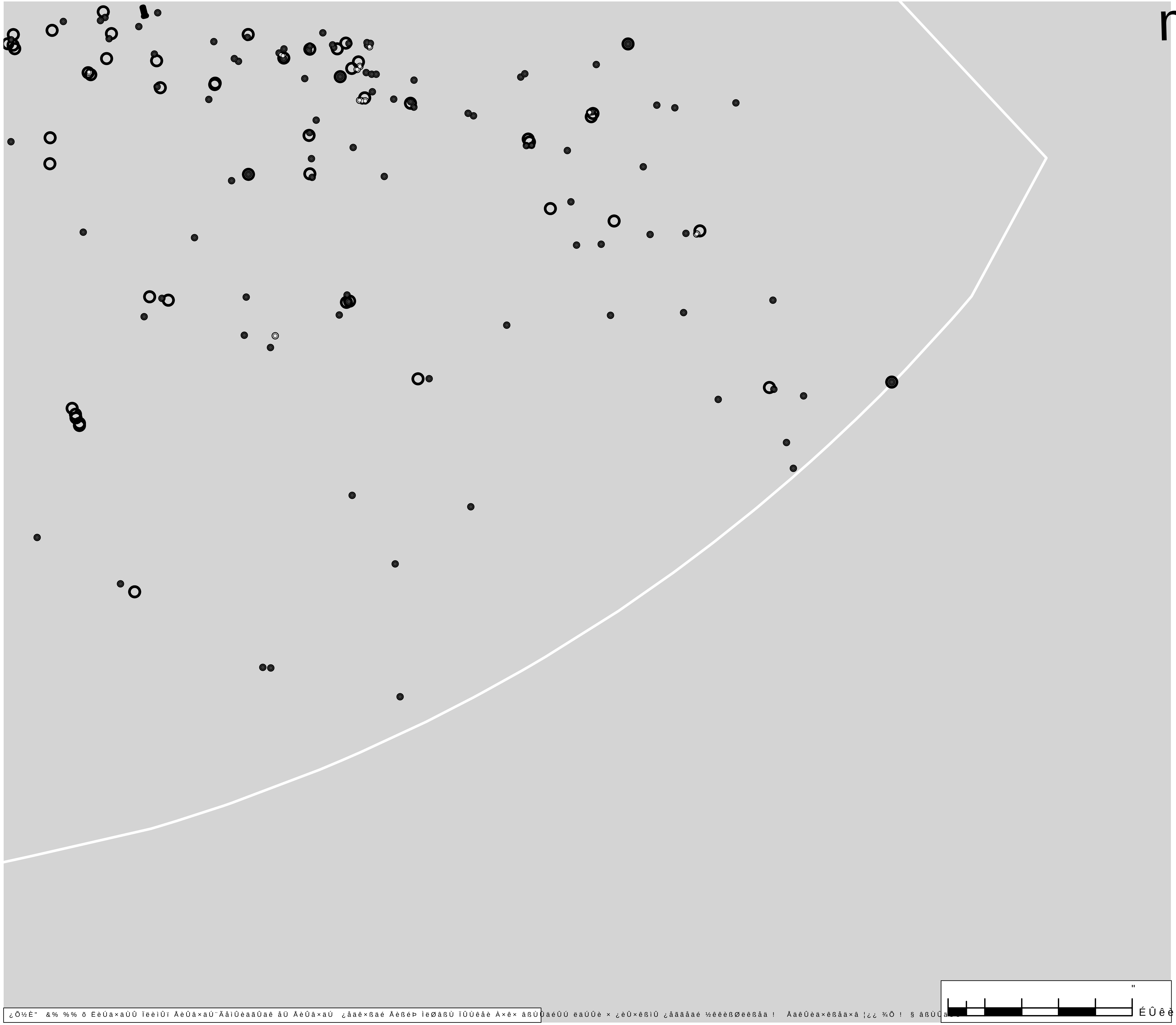

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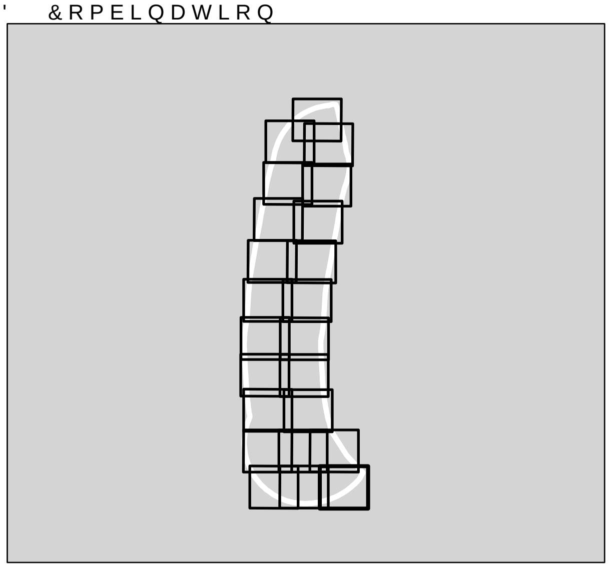

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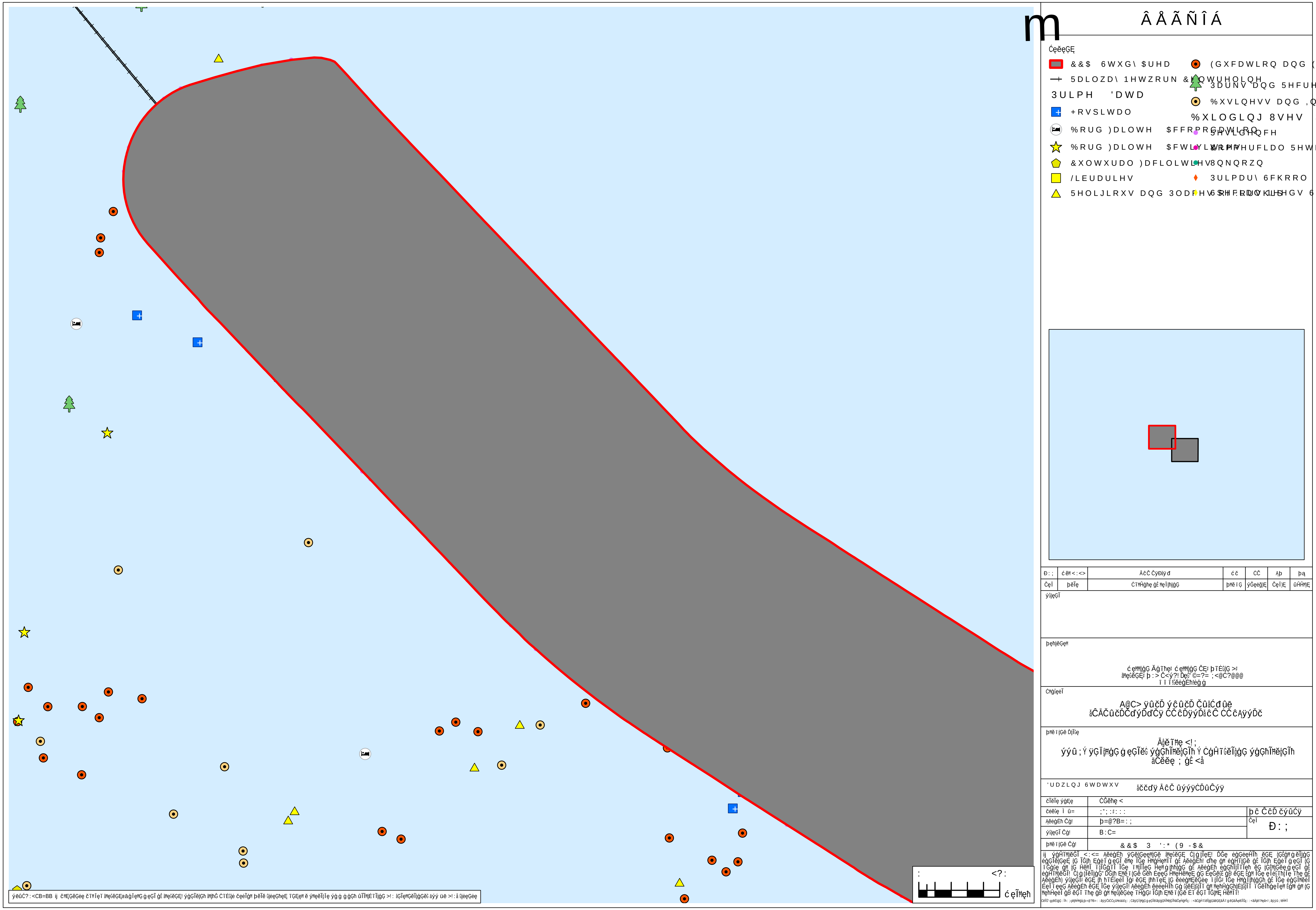
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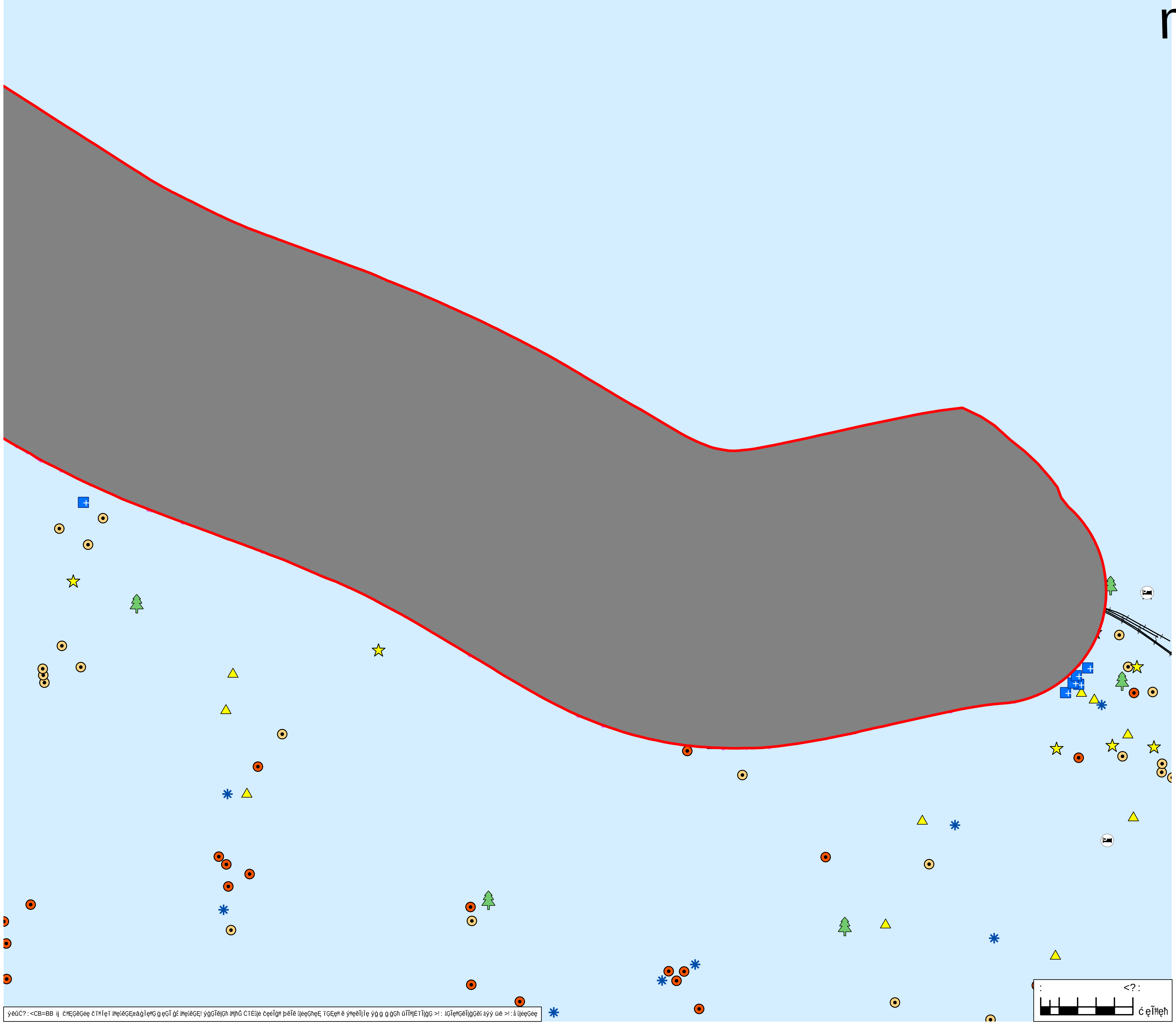

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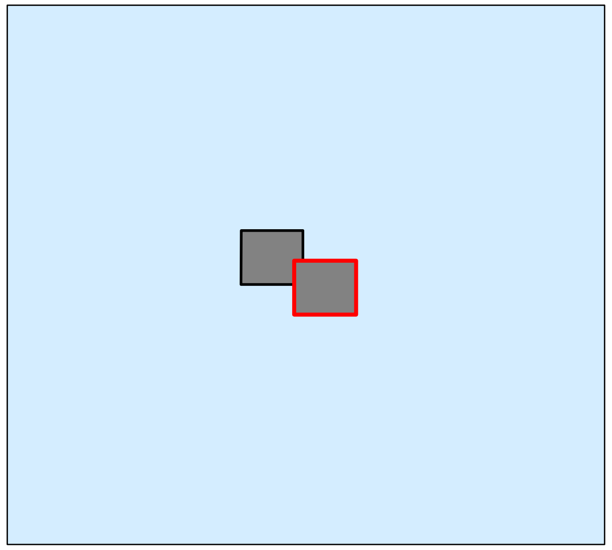

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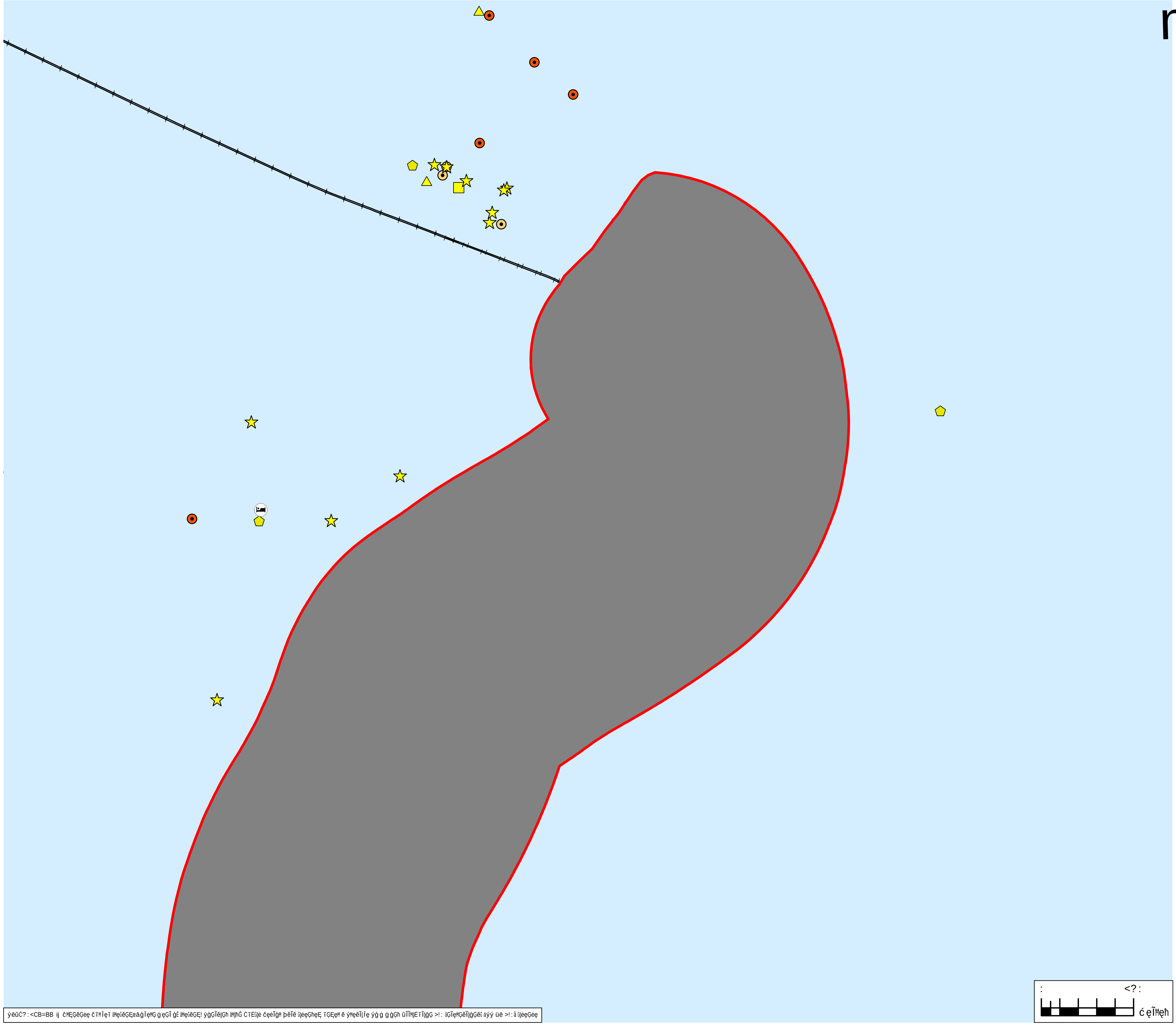
þĦě ī ĝĢě Ĉģ!	& & $ 3 ' : * (9 -$&	

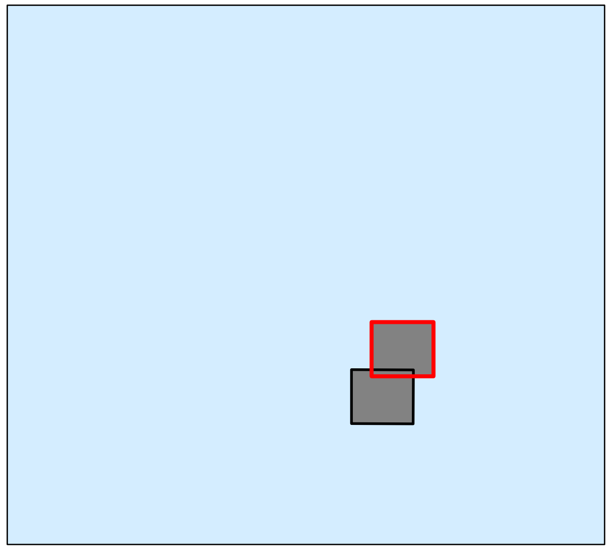
ĳ ýģĤĭĦĝěĜĪ <:<= ĄěėģĖħ ÿĢěĝĢęęĦĝĢě ăĦęĠěĢĘ Ćĝġĝ ĪęĘ! ĎĜę ėģĢėęĤĪħ ěĢĘ ĝĢĚģĦġ ěĪĝģĢ ėģĢĪěĝĢęĘ ĝĢ ĪĜĝħ Ęģėĭ ġ ęĢĪ ěĦę ĪĜę ĤĦģĤęĦĪĭ ģĚ ĄěėģĖħ! ďħę ģĦ ėģĤĭĝĢě ģĚ ĪĜĝħ Ęģėĭ ġ ęĢĪ ĝĢ ĭĜģĠę ģĦ ĝĢ ĤěĦĪ ĭĝĪĜģĭĪ ĪĜę ĭĦĝĪĪęĢ ĤęĦ ġ ĝħħĝģĢ ģĚ ĄěėģĖħ ėģĢħĪĝĪĭĪęħ ěĢ ĝĢĚĦĝĢěę ġ ęĢĪ ģĚ ėģĤĭĦĝěĜĪ! Ćĝ ġ ĝĪěĪĝģĢ" ĎĜĝħ ĘĦě ĭĝĢě Ĝěħ ĖęęĢ ĤĦęĤěĦęĘ ģĢ ĖęĜěĠĚ ģĚ# ěĢĘ Ěģĭ ĪĜę ęĪėĠĭħĝĪę ĭħę ģĚ ĄěėģĖħ) ýĠĝęĢĪ# ěĢĘ ĝħ ħĭĖĞęėĪ Īģ# ěĢĘ ĝħħĭęĘ ĝĢ ėėģĦĘěĢėę ĭĝĪĜ# ĪĜę ĪęĦġ ħĝģĢħ ģĚ ĪĜę ėģĢĪĦěėĪ ĖęĪĭ ęęĢ ĄěėģĖħ ěĢĘ ĪĜę ýĠĝęĢĪ! ĄěėģĖħ ěėėęĤĪħ Ģģ ĠĝěĖĝĠĝĪĭ ģĦ ĦęħĤģĢħĝĖĝĠĝĪĭ ĭĜěĪħģęĭęĦ Ěģĭ ģĦ ĝĢ ĦęħĤęėĪ ģĚ# ěĢĭ ĭħę ģĚ# ģĦ ĦęĠĝěĢėę ĭĤģĢ# ĪĜĝħ ĘĦě ĭĝĢě Ėĭ ěĢĭ ĪĜĝĦĘ Ĥěĩĭĭ!



ÂÅÃÑÎÁ

/HJHQG

- 🟥 &&$ 6WXG\ $UHD
- ─┼─ 5DLOZD\ 1HWZRUN &HQWUHOL
- 3ULPH 'DWD
- ☆ %RUG)DLOWH $FWLYLWLHV
- ● %RUG)DLOWH $FFRPPRGDWLRQ
- ⬟ &XOWXUDO)DFLOLWLHV
- ☐ /LEUDULHV
- △ 5HOLJLRXV DQG 3ODFHV RI :RU
- ● (GXFDWLRQ DQG (QWHUSULVH
- ● %XVLQHVV DQG ,QGXVWU\
- %XLOGLQJ 8VHV 3ULPH
- ● 5HVLGHQFH
- ● 8QNQRZQ



Đ:;	ćěĦ<:<>	ĀĉČ ČÿĐåÿđ	ćč	ĊČ	Ąþ	þą
ČęĪ	þěĪę	ĊĪĦĤġħę ġĔ ĦęĪġħġġĢ	þĦěĪĢ	ýĜęėğ)Ę	ČęĪ)Ę	ûĤĤĦ)Ę

ýĝġęĢĪ

þęħġěĢęĦ

ć ęĦĦġġĢ Ăġĩħę# ć ęĦĦġġĢ ČĘ# þĩĖĝġĢ >#
ăĦęĝěĢĘ# þ:> Č<ý?! Ďęĝ" ©=?= ;<@C?@@@
ĩ ĩ ĩ!ĝěėġĘħ!ėġ ġ

ĊĦġĝęėĪ

A@C> ÿûčĎ ýĉûčĎ ČûăĆđûē
ăĈĀČûčĎČďýĎďČÿ ĊČĉĎÿýĎăĉĈ ĊČĉĄÿýĎč

þĦěĩġĢě ĎġĪĝę

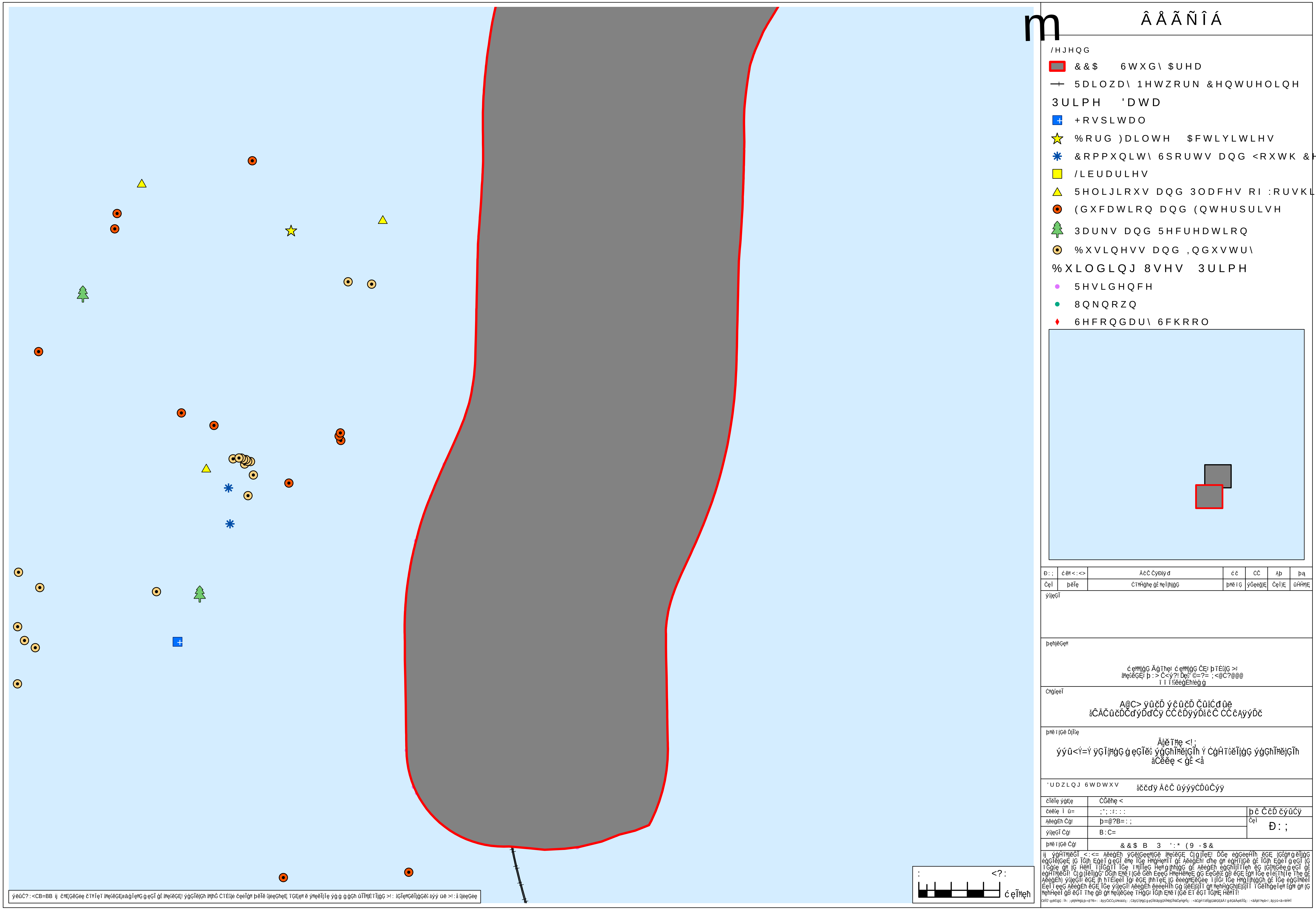
Āġěĩĥę <!;
ýýû<Ý=Ý ÿĢĪġĦġĢ ġ ęĢĪěĝ ýġĢħĪĦěġĢĪħ Ý ĊġĤĩĝěĪġġĢ ýġĢħĪĦěġĢĪħ
äČěěę ; ġĔ <å

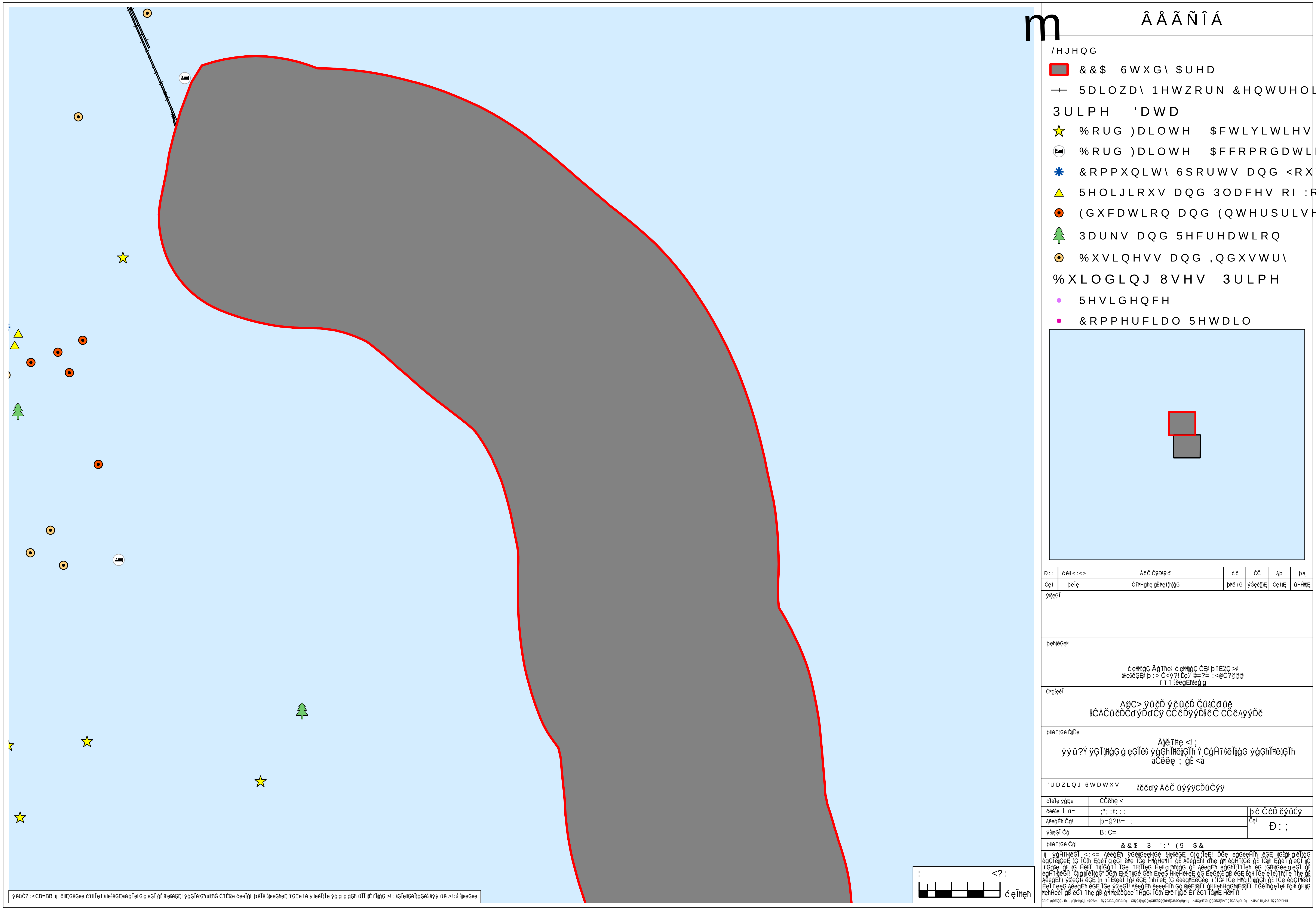
'UDZLQJ 6WDWXV ăččďÿ ĀĉČ ûýýÿĊĎûĈýÿ

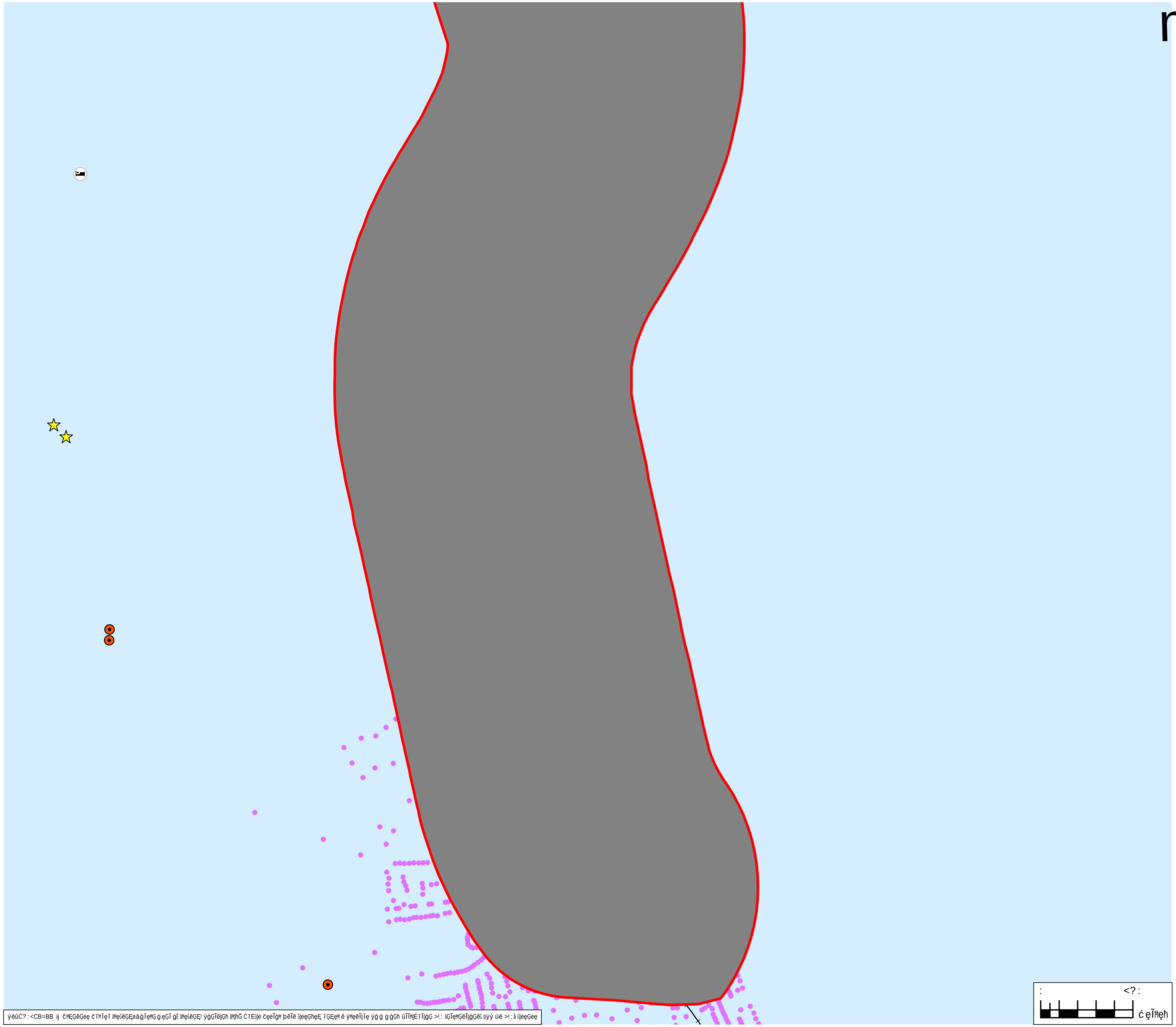
čĪěĪę ýġĘę	ĊĜěħę <	
čėěĝę Ì û=	;"; :#: : :	þĉ ĈĉĎ čýûĆÿ
ĄěėġĖħ Ĉġ!	þ=@?B=: ;	ČęĪ Đ:;
ýĝġęĢĪ Ĉġ!	B:C=	
þĦěĩġĢě Ĉġ!	&&$ B 3 ':* (9 -$&	

[illegible]

ĊěĪĜ" ççĝěĖĝġĢ: Īħ: ; çěġħĤĦġĝçþ=@?B=: : ãýýĈăĊĈçûĦěăčç: ; ĈãÿĢĪġĦġĢ ġ ęĢĪěĝãýġĢħĪĦěġĢĪħãČęĤġĦĪç: : <ãĈġĤĩĝěĪġġĢãěĢĘãĂĪ ġ ěĢãĀęěĝĪĜç: : <ãĀġĕĩĦęã<!;ãýýû<ã=!ěĤĦĪ


m
ÂÅÃÑÎÁ
/HJHQG
&&$ 6WXG\ $UHD
5DLOZD\ 1HWZRUN &HQWUHOLQH
3ULPH 'DWD
+RVSLWDO
%RUG)DLOWH $FWLYLWLHV
&RPPXQLW\ 6SRUWV DQG <RXWK &HQW
/LEUDULHV
5HOLJLRXV DQG 3ODFHV RI :RUVKLS
(GXFDWLRQ DQG (QWHUSULVH
3DUNV DQG 5HFUHDWLRQ
%XVLQHVV DQG ,QGXVWU\
%XLOGLQJ 8VHV 3ULPH
5HVLGHQFH
8QNQRZQ
6HFRQGDU\ 6FKRRO
'UDZLQJ 6WDWXV
&&$ B 3 ':* (9 -$&
<?:


m
/HJHQG
&&$ 6WXG\ $UHD
5DLOZD\ 1HWZRUN &HQWUHOLQH
3ULPH 'DWD
%RUG)DLOWH $FWLYLWLHV
%RUG)DLOWH $FFRPPRGDWLRQ
&RPPXQLW\ 6SRUWV DQG <RXWK
5HOLJLRXV DQG 3ODFHV RI :RUV
(GXFDWLRQ DQG (QWHUSULVH
3DUNV DQG 5HFUHDWLRQ
%XVLQHVV DQG ,QGXVWU\
%XLOGLQJ 8VHV 3ULPH
5HVLGHQFH
&RPPHUFLDO 5HWDLO
'UDZLQJ 6WDWXV
&&$ 3 ':* (9 -$&



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<?:
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m

ÂÅÃÑÎÁ

/HJHQG

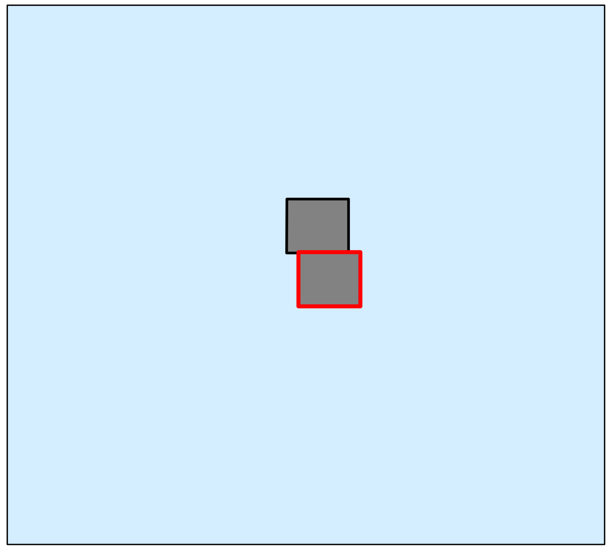
🟥	&&$ 6WXG\ $UHD
⊣	5DLOZD\ 1HWZRUN &HQWUHOL

3ULPH 'DWD

☆	%RUG)DLOWH $FWLYLWLHV
🛏	%RUG)DLOWH $FFRPRGDWLR
◉	(GXFDWLRQ DQG (QWHUSULVH

%XLOGLQJ 8VHV 3ULPH

●	5HVLGHQFH
♦	6HFRQGDU\ 6FKRRO



Đ:;	ćĕĦ<:<>	ĀĉČ ČÿĐăÿđ	ćč	ĊČ	Ąþ	þą
Čęĭ	þĕĪę	ĊĭĦĤģħę ģĚ ĦęĪĝħĝģĢ	þĦĕĭĢ	ýĜęėĞ)Ę	ČęĪ)Ę	ûĤĤĦ)Ę

ýĝĝęĢĪ

þęħĝĕĢęĦ

ćęĦĦĝģĢ Ăģĭĥę# ćęĦĦĝģĢ ČĘ# þĭĖĝĠĝĢ >#
ăĦęĠĕĢĘ# þ:> Č<ý?! Đęġ" ©=?= ;<@C?@@@
ĭ ĭ ĭ!ĝĕėģĖħ!ėģ ġ

ĊĦģĞęėĪ

A@C> ÿûčĎ ýĉûčĎ ČûăĆđûē
ăĈĀČûčĎČďýĎďČÿ ĊČĉĎÿýĎăĉĈ ĊČĉĄÿýĎč

þĦĕĭĝĢĕ ĎĝĪĠę

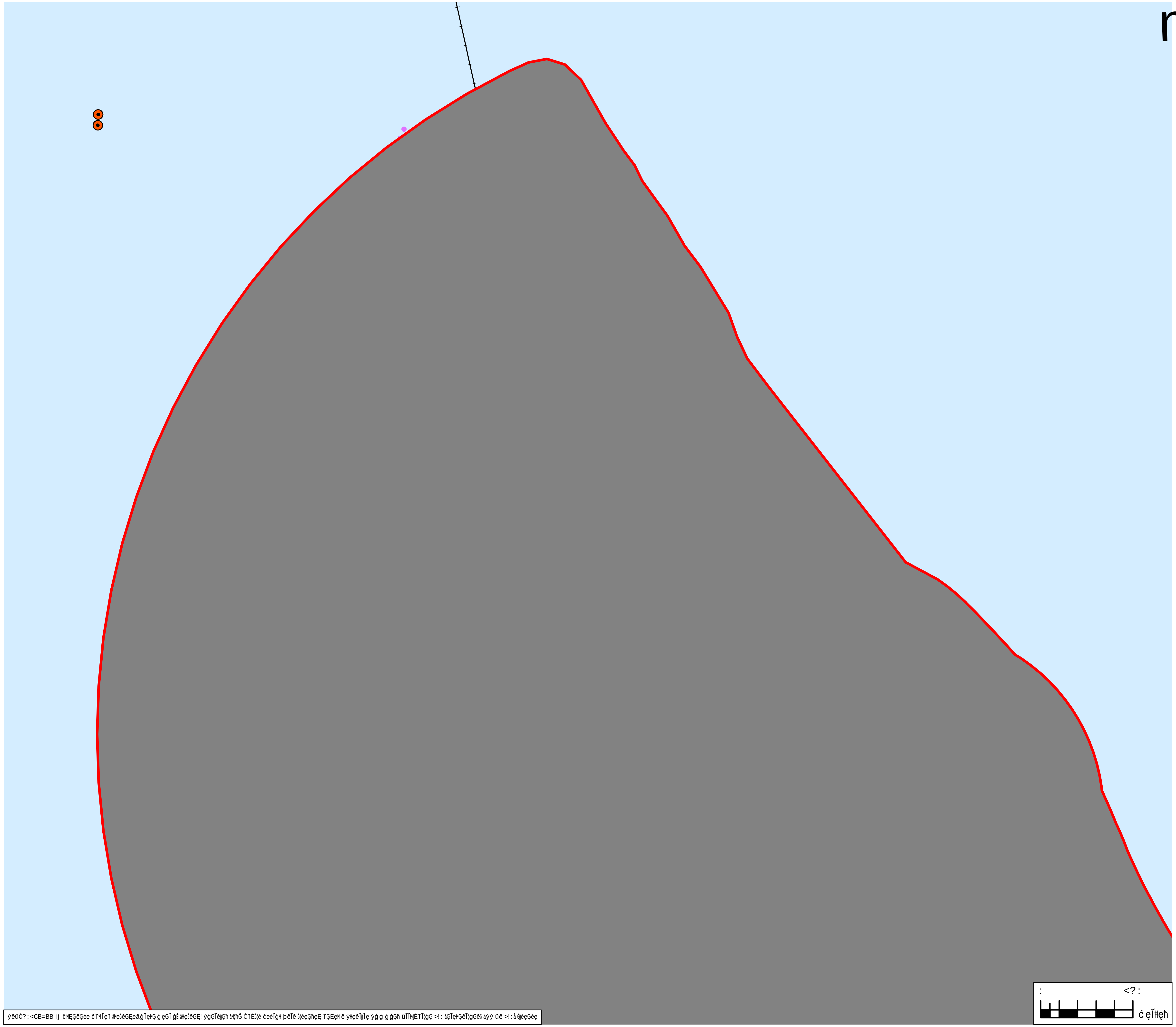
Āĝĕĭĭĥę <!;
ýýû?Ý ÿĢĪĝĦģĢ ġ ęĢĪĕĠ ýģĢħĪĦĕĝĢĪħ Ý ĊģĤĭĠĕĪĝģĢ ýģĢħĪĦĕĝĢĪħ
äČĕĕę < ģĚ <å

'UDZLQJ 6WDWXV — ăččďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĪĕĪę ýģĘę	ĊĈĕĦę <	
čėĕĠę Ì û=	;";:#:::	þĉ ĈĉĎ čýûĆÿ
ĄĕėģĖħ Ĉģ!	þ=@?B=:;	Čęĭ Đ:;
ýĝĝęĢĪ Ĉģ!	B:C=	
þĦĕĭĝĢĕ Ĉģ!	&&$ 3 ':* (9 -$&	

[illegible]

[illegible]



ÂÅÃÑÎÁ

/HJHQG

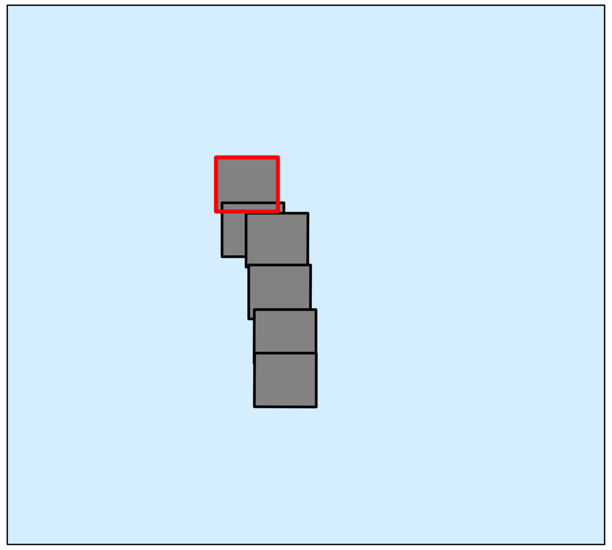
🟥	&&$ 6WXG\ $UHD
┼	5DLOZD\ 1HWZRUN &HQWUHOLQH

3ULPH 'DWD

☆	%RUG)DLOWH $FWLYLWLHV
🟨	/LEUDULHV
△	5HOLJLRXV DQG 3ODFHV RI :RUVKLS
●	(GXFDWLRQ DQG (QWHUSULVH
▲	3DUNV DQG 5HFUHDWLRQ
●	%XVLQHVV DQG ,QGXVWU\

%XLOGLQJ 8VHV 3ULPH

●	5HVLGHQFH
●	&RPPHUFLDO 5HWDLO
●	8QNQRZQ
♦	3ULPDU\ 6FKRRO
♦	6HFRQGDU\ 6FKRRO
♦	0RQWHVVRUL 6FKRRO



Đ: ;	ćĕĦ<:<>	ĀĉČ ČÿĐǎÿđ	ćč	ĊČ	Ąþ	þą
Čęī	þĕĪę	ĊĪĦĤĝħę ĝĔ ĦęĪĝħĝĝĜ	þĦĕīĜ	ÿĜęėĝĘĔ	ČęĪĘ	ûĤĤĦĘ

ÿĝęĜĪ

þęħĝĕĜęĦ

ć ęĦĦĝĝĜ Ăĝīħę ć ęĦĦĝĝĜ ČĘ þīĖĜĝĜ >
ăĦęĜĕĜĘ þ:> Č<ý?! Dę" ©=?= ;<@C?@@@
ī ī ī!ĜĕėĝĘħ!ėĝ ĝ

ĊĦĝĝęėĪ

A@C> ÿûčĎ ýĉûčĎ ČûǎĆđûē
ǎĈĀČûčĎČďýĎďČÿ ĊČĉĎÿýĎǎĉĈ ĊČĉĄÿýĎč

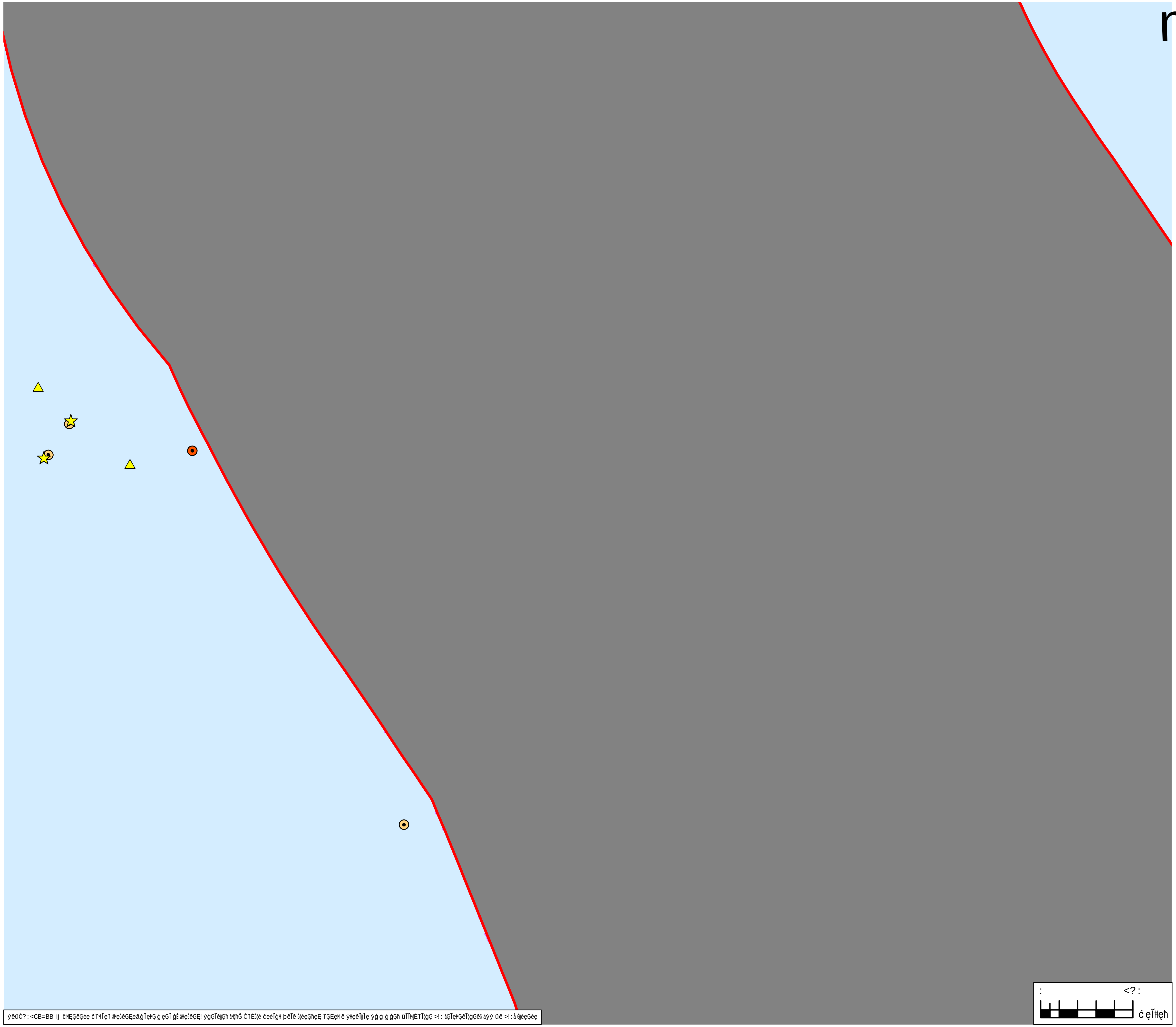
þĦĕīĝĜĕ ĎĝĪĜę

Āĝĕ īĦę <! ;
ýýû@! ; Ý ÿĜĪĝĦĝĜ ĝ ęĜĪĕĜ ýĝĜħĪĦĕĝĜĪħ Ý ĊĝĤīĜĕĪĝĝĜ ýĝĜħĪĦĕĝĜĪħ
äĈĕĕę ; ĝĔ @å

'UDZLQJ 6WDWXV ǎččďÿ ĀĉČ ûýýÿĊĎûĈÿý

čĪĕĪę ýĝĘę	ĊĜĕħę <	
čĕĕĜę Ì û=	;"; :#: : :	þĉ ĈĉĎ čýûĈÿ
ĄĕėĝĘħ Ĉĝ!	þ=@?B=: ;	Čęī Đ: ;
ÿĝĝęĜĪ Ĉĝ!	B:C=	
þĦĕīĝĜĕ Ĉĝ!	&&$ B 3 ':* (9 -$&	

[illegible]



ÂÅÃÑÎÁ

/HJHQG

🟥 &&$ 6WXG\ $UHD

— 5DLOZD\ 1HWZRUN &HQWUHOLQH

3ULPH 'DWD

☆ %RUG)DLOWH $FWLYLWLHV

✱ &RPPXQLW\ 6SRUWV DQG <RXWK &HQ

🟨 /LEUDULHV

△ 5HOLJLRXV DQG 3ODFHV RI :RUVKLS

◉ (GXFDWLRQ DQG (QWHUSULVH

3DUN DQG 5HFUHDWLRQ

◉ %XVLQHVV DQG ,QGXVWU\

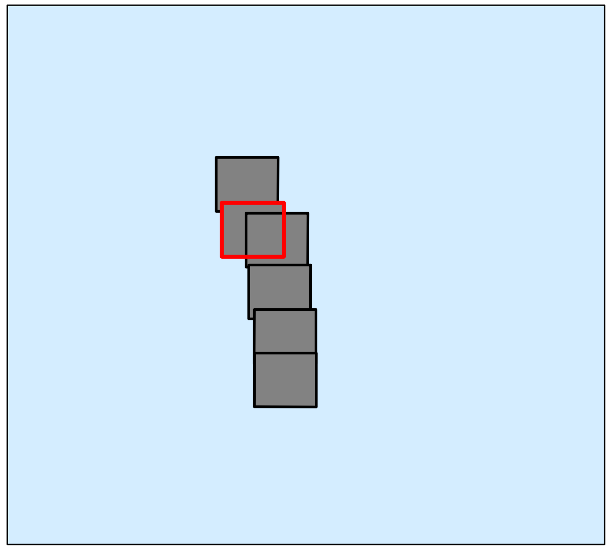
%XLOGLQJ 8VHV 3ULPH

● 5HVLGHQFH

● &RPPHUFLDO 5HWDLO

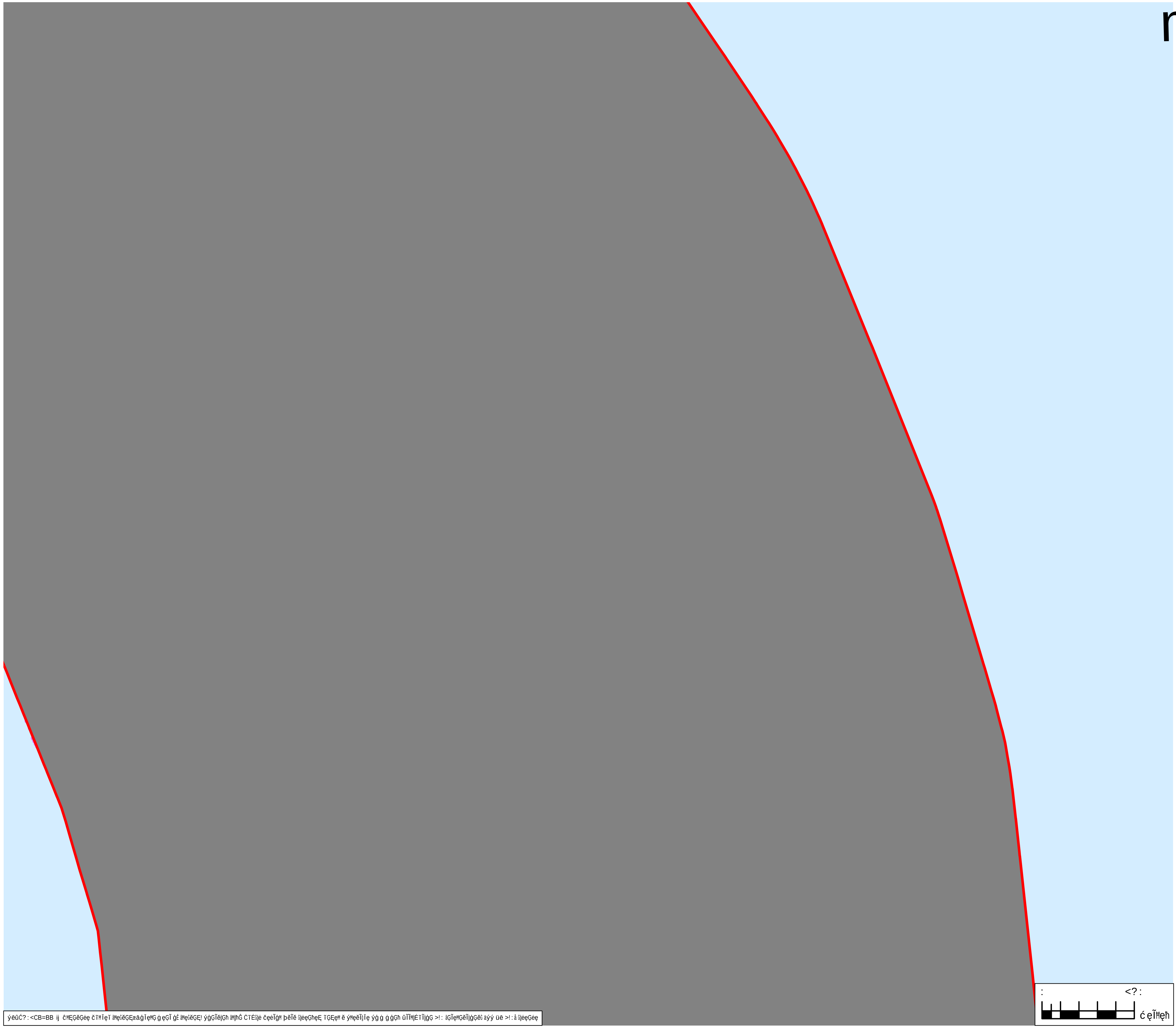
● 8QNQRZQ

♦ 3ULPDU\ 6FKRRO



'UDZLQJ 6WDWXV

&&$ B 3 ':* (9 -$&



ÂÅÃÑÎÁ

/HJHQG

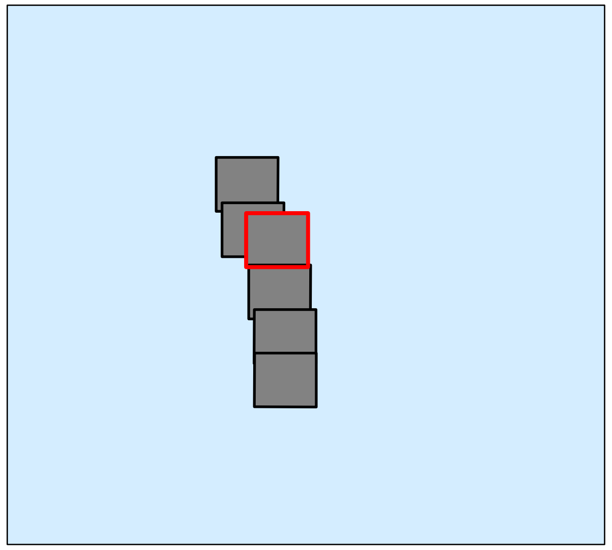
- 🟥 &&$ 6WXG\ $UHD
- 5DLOZD\ 1HWZRUN &HQWUHOL

3ULPH 'DWD

- ☆ %RUG)DLOWH $FWLYLWLHV
- ✱ &RPPXQLW\ 6SRUWV DQG <RXW
- 3DUNV DQG 5HFUHDWLRQ
- ⊙ %XVLQHVV DQG ,QGXVWU\

%XLOGLQJ 8VHV 3ULPH

- ● 5HVLGHQFH
- ● &RPPHUFLDO 5HWDLO
- ● 8QNQRZQ



Đ:;	ćĕĦ<:<>	ĀĉČ ČÿĐăÿđ	ćč	ĊČ	Ąþ	þą
Čęī	þĕĪę	ĊīĦĤġħę ġĚ ĦęĪġħġġĢ	þĦĕīĢ	ýĜęėĕ)Ę	ČęĪ)Ę	ûĤĤĦ)Ę

ýġġęĢĪ

þęħġĕĢęĦ

ć ęĦĦġġĢ Ăġīħę# ć ęĦĦġġĢ ČĘ# þīĖġĢ >#
ăĦęġĕĢĘ# þ:> Č<ý?! Đęġ" ©=?= ;<@C?@@@
ī ī ī!ġĕėġĖħ!ėġ ġ

ĊĦġġęėĪ

A@C> ÿûčĎ ýĉûčĎ Čûăćđ ûē
ăĈĀČûčĎČďýĎďČÿ ĈČĉĎÿýĎăĉĈ ĈČĉĄÿýĎč

þĦĕīġĢĕ ĎġĪġę

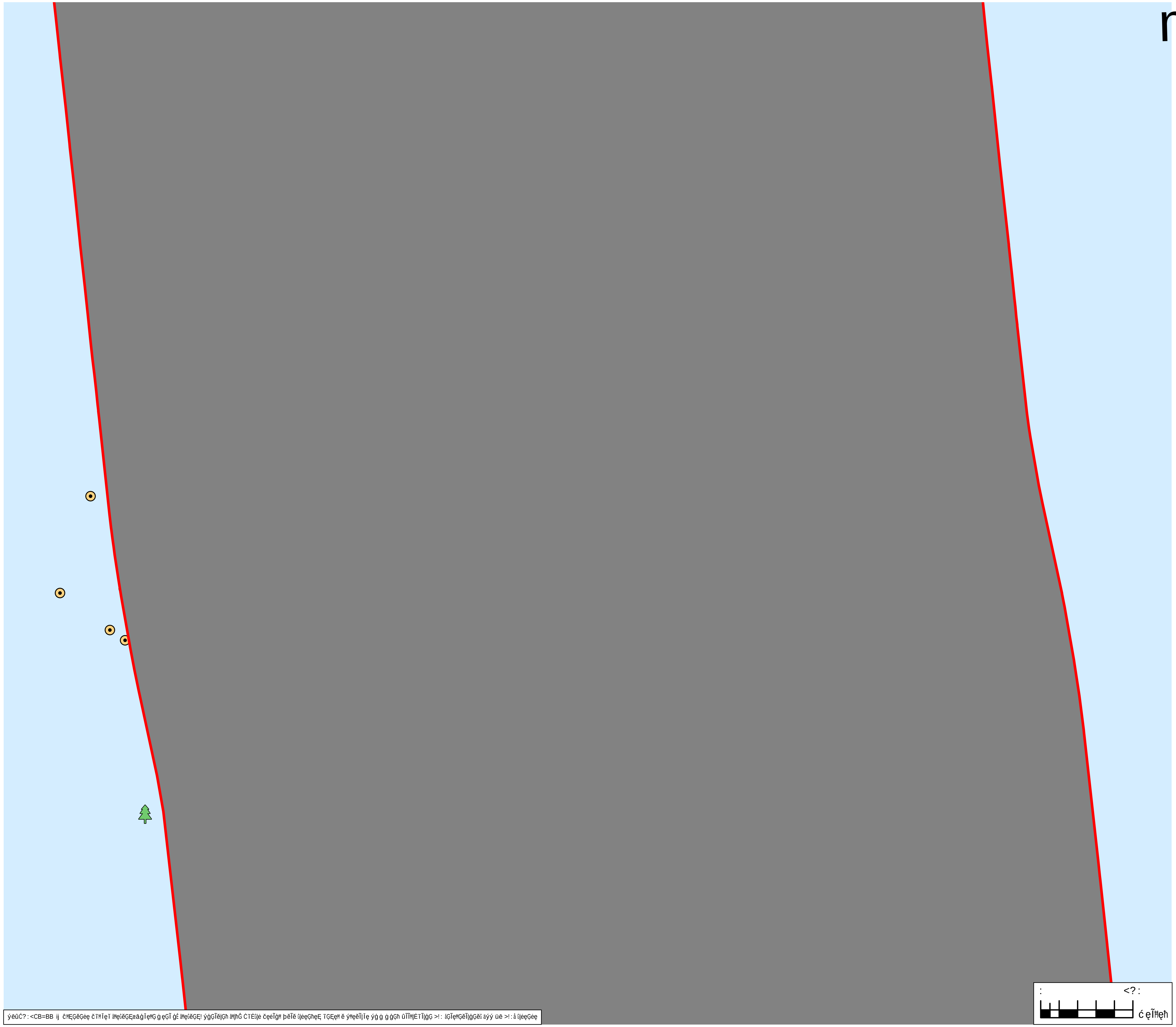
Āġĕ īĦę <!;
ýýû@!;Ý ÿĢĪġĦġĢ ġ ęĢĪĕġ ýġĢħĪĦĕġĢĪħ Ý ĊġĤīġĕĪġġĢ ýġĢħĪĦĕġĢĪħ
äĊĕĕę = ġĚ @å

'UDZLQJ 6WDWXV ăččďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĪĕĪę ýġĘę	ĊĜĕħę <	
čėĕġę ī û=	;";:#:::	þĉ ĈĉĎ čýûĆÿ
ĄĕėġĖħ Ĉġ!	þ=@?B=:;	Čęī Đ:;
ýġġęĢĪ Ĉġ!	B:C=	
þĦĕīġĢĕ Ĉġ!	&&$ B 3 ':* (9 -$&	

ij ýġĤīĦġĕĜĪ <:<= ĄĕėġĖħ ÿĢĕġĢęęĦġĢĕ ăĦęġĕĢĘ Ćġ ġ ġĪęĘ! ĎĜę ėġĢėęĤĪħ ĕĢĘ ġĢĚġĦ ġĕĪġġĢ ėġĢĪĕġĢęĘ ġĢ ĪĜġħ Ęġė ī ġ ęĢĪ ĕĦę ĪĜę ĤĦġĤęĦĪī ġĚ ĄĕėġĖħ! ďħę ġĦ ėġĤīġĢĕ ġĚ ĪĜġħ Ęġė ī ġ ęĢĪ ġĢ īĜġġę ġĦ ġĢ ĤĕĦĪ īġĪĜġīĪ ĪĜę īĦġĪĪęĢ Ĥęġ ġħħġġĢ ġĚ ĄĕėġĖħ ėġĢħĪġĪīĪęħ ĕĢ ġĢĚĦġĢĕęġ ęĢĪ ġĚ ėġĤīĦġĕĜĪ! Ćġ ġ ġĪĕĪġġĢ" ĎĜġħ ĘĦĕīġĢĕ Ĝĕħ ĖęęĢ ĤĦęĤĕĦęĘ ġĢ ĖęĜĕġĚ ġĚ# ĕĢĘ Ěġ ĦĪĜę ęĬėġīħġĪę īħę ġĚ ĄĕėġĖħ) ýġġęĢĪ# ĕĢĘ ġħ ħīĖġęėĪ Īġ# ĕĢĘ ġħħīęĘ ġĢ ĕėėġĦĘĕĢėę īġĪĜ# ĪĜę ĪęĦġħ ġĚ ĪĜę ėġĢĪĦĕėĪ ĖęĪīęęĢ ĄĕėġĖħ ĕĢĘ ĪĜę ýġġęĢĪ! ĄĕėġĖħ ĕėėęĤĪħ Ģġ ġġĕĖġġġĪī ġĦ ĦęħĤġĢħġĖġġġĪī īĜĕĪħġęīęĦ Ěġ Ħ# ġĦ ĦęġġĕĢėę īĤġĢ# ĪĜġħ ĘĦĕīġĢĕ Ėī ĕĢī ĪĜġĦĘ Ĥĕ ĦĪī!

ĊĕĪĜ" ççĕĖġġĢ:Īħ:;çęġħĤĦġġġçþ=@?B=::ãÿýČăĊĈçûĦėĕăčç:;CãÿĢĪġĦġĢ ġ ęĢĪĕġãýġĢħĪĦĕġĢĪħãČęĤġĦĪç::<ãĊġĤīġĕĪġġĢãĕĢĘãĀĪ ġ ĕĢãĀęĕġĪĜç::<ãĀġĕīĦęã<!;ãýýû@ã;!ĕĤĦĪ



ÂÅÃÑÎÁ

/HJHQG

🟥 &&$ 6WXG\ $UHD

┼ 5DLOZD\ 1HWZRUN &HQWUHOLQH

3ULPH 'DWD

☆ %LUG)DLOWH $FWLYLWLHV

△ 5HOLJLRXV DQG 3ODFHV RI :RUVKL

● (GXFDWLRQ DQG (QWHUSULVH

🌲 3DUNV DQG 5HFUHDWLRQ

⊙ %XVLQHVVHV DQG ,QGXVWU\

%XLOGLQJ 8VHV 3ULPH

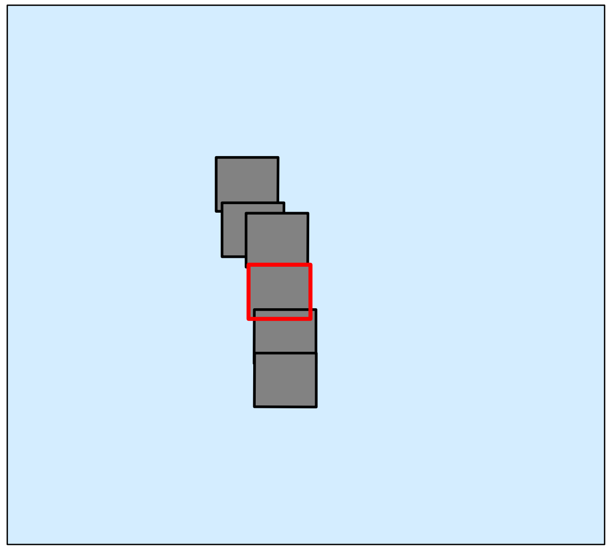
● 5HVLGHQFH

● &RPPHUFLDO 5HWDLO

● 8QNQRZQ

♦ 3ULPDU\ 6FKRRO

♦ 6HFRQGDU\ 6FKRRO



Ð:;	ćĕĦ<:<>	ĀĉČ ČÿĐăÿđ	ćč	ĊČ	Ąþ	þą
Čęī	þĕĪę	ĊĭĦĤġħę ġĚ ĦęĪġħġĢ	þĦĕ ī Ģ	ýĜęėĕ)Ę	ČęĪ)Ę	ûĤĤĦ)Ę

ýĠĝęĢĪ

þęħĝĕĢęĦ

ć ęĦĦĝġĢ Ăġĭħę# ć ęĦĦĝġĢ ČĘ# þ ĭĖĠĝĢ >#
ăĦęĠĕĢĘ# þ:> Č<ý?! ĎęĠ" ©=?= ;<@C?@@@
ī ī ī!ĠĕėġĖħ!ėġ ġ

ĊĦġĠęėĪ

A@C> ÿûčĎ ýĉûčĎ ČûăĆđ ûē
ăĈĀČûčĎČďýĎďČÿ ĊČĉĎÿýĎăĉĈ ĊČĉĄÿýĎč

þĦĕ ī ĝĢĕ ĎĝĪĠę

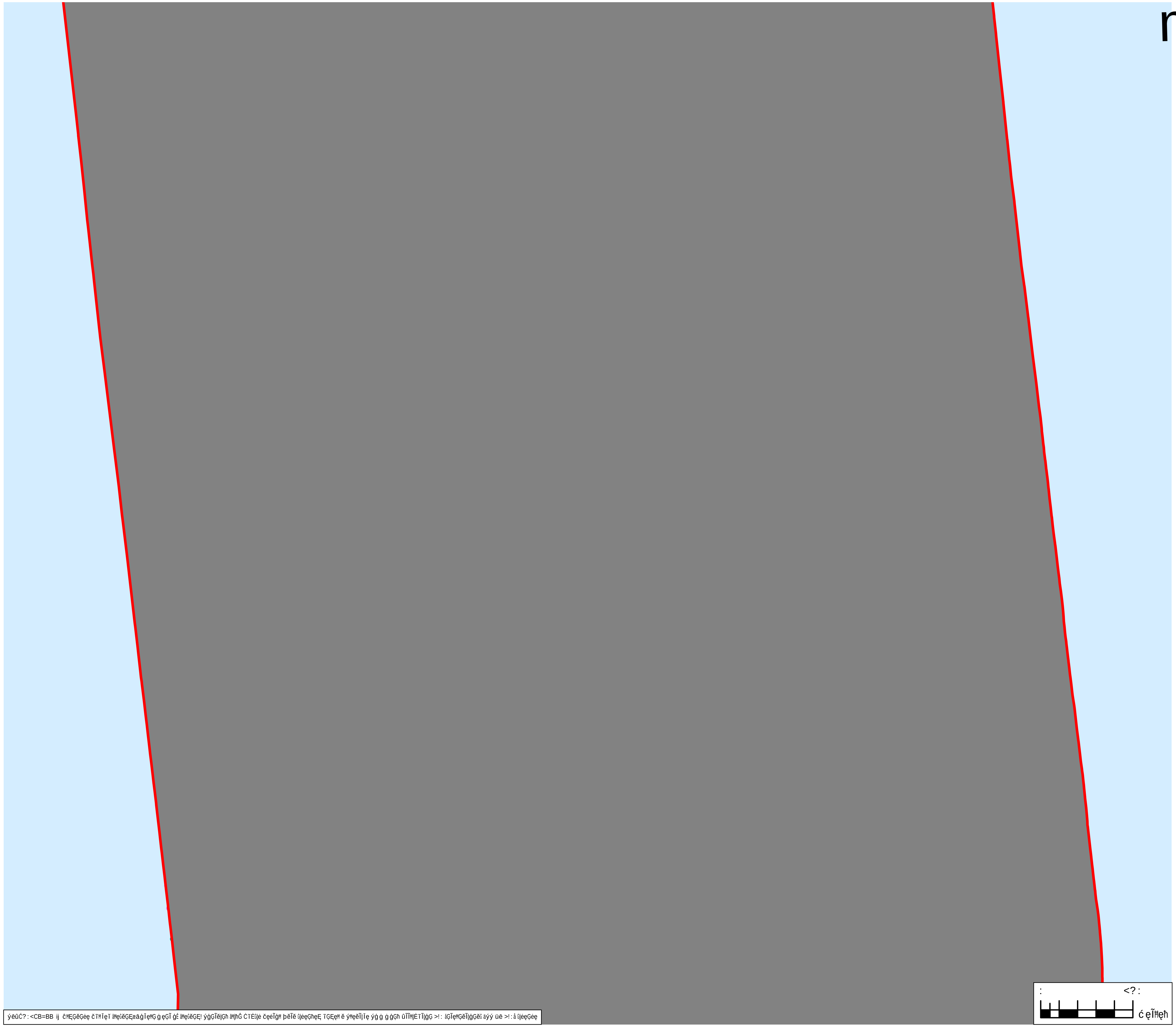
Āĝĕ ĭĦę <!;
ýýû@!;Ý ÿĢĪĝĦġĢ ġ ęĢĪĕĠ ýġĢħĪĦĕĝĢĪħ Ý ĊġĤ ĭĠĕĪĝġĢ ýġĢħĪĦĕĝĢĪħ
äĊĕĕę > ġĚ @å

'UDZLQJ 6WDWXV ăččďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĪĕĪę ýġĘę	ĊĈĕħę <	
čėĕĠę Ì û=	;";:#:::	þĉ ĈĉĎ čýûĆÿ
ĄĕėġĖħ Ĉġ!	þ=@?B=:;	Čęī Ð:;
ýĠĝęĢĪ Ĉġ!	B:C=	
þĦĕ ī ĝĢĕ Ĉġ!	&&$ B 3 ':* (9 -$&	

ij ýġĤ ĭĦĝĕĈĪ <:<= ĄĕėġĖħ ÿĢĕĝĢęęĦĝĢĕ ăĦęĠĕĢĘ ĆĝġĝĪęĘ! ĎĈę ėġĢėęĤĪħ ĕĢĘ ĝĢĚġĦġĕĪĝġĢ ėġĢĪĕĝĢęĘ ĝĢ ĪĈĝħ Ęġė ĭ ġęĢĪ ĕĦę ĪĈę ĤĦġĤęĦĪĭ ġĚ ĄĕėġĖħ! ďħę ġĦ ėġĤĭĝĢĕ ġĚ ĪĈĝħ Ęġė ĭ ġęĢĪ ĝĢ ĪĈġĠę ġĦ ĝĢ ĤĕĦĪ ī ĝĪĈġ ĭĪ ĪĈę ī ĦĝĪĪęĢ ĤęĦ ġĝħħĝġĢ ġĚ ĄĕėġĖħ ėġĢħĪĝĪ ĭĪęħ ĕĢ ĝĢĚĦĝĢĕę ġ ęĢĪ ġĚ ėġĤĭĦĝĕĈĪ! Ċĝ ġĝĪĕĪĝġĢ" ĎĈĝħ ĘĦĕ ī ĝĢĕ Ĉĕħ ĖęęĢ ĤĦęĤĕĦęĘ ġĢ ĖęĈĕĠĚ ġĚ# ĕĢĘ Ěġ Ħ ĪĈę ęĩėĠĭħĝĪę ĭħę ġĚ ĄĕėġĖħ) ýĠĝęĢĪ# ĕĢĘ ĝħ ħĭĖĄęėĪ ĪġĦ# ĕĢĘ ĝħħĭęĘ ĝĢ ĕėėġĦĘĕĢėę ī ĝĪĈ# ĪĈę ĪęĦġħ ġĚ ĪĈę ėġĢĪĦĕėĪ ĖęĪī ęęĢ ĄĕėġĖħ ĕĢĘ ĪĈę ýĠĝęĢĪ! ĄĕėġĖħ ĕėėęĤĪħ Ģġ ĠĝĕĖĝĠĝĪĭ ġĦ ĦęħĤġĢħĝĖĝĠĝĪĭ ī ĈĕĪħġęĪęĦ Ěġ Ħ# ġĦ ĦęĠĝĕĢėę ĭĤġĢ# ĪĈĝħ ĘĦĕ ī ĝĢĕ Ėĭ ĕĢĭ ĪĈĝĦĘ ĤĕĦĪĭ!

ĊĕĪĈ" ççĕĖėġĢ:Īħ:; çęĝħĤĦġĝç þ=@?B=::ãÿýČăĊĊçûĦėãăčç:;CãÿĢĪĝĦġĢ ġ ęĢĪĕĠãýġĢħĪĦĕĝĢĪħãČęĤġĦĪç::<ãĊġĤ ĭĠĕĪĝġĢãĕĢĘãĂ ī ĕĢãĂęĕĠĪĈç::<ãĀĝĕ ĭĦęã<!;ãýýû@ã;!ĕĤĦĪ



ÂÅÃÑÎÁ

/HJHQG

🟥 &&$ 6WXG\ $UHD

5DLOZD\ 1HWZRUN &HQWUHOL

3ULPH 'DWD

☆ %RUG)DLOWH $FWLYLWLHV

3DUNV DQG 5HFUHDWLRQ

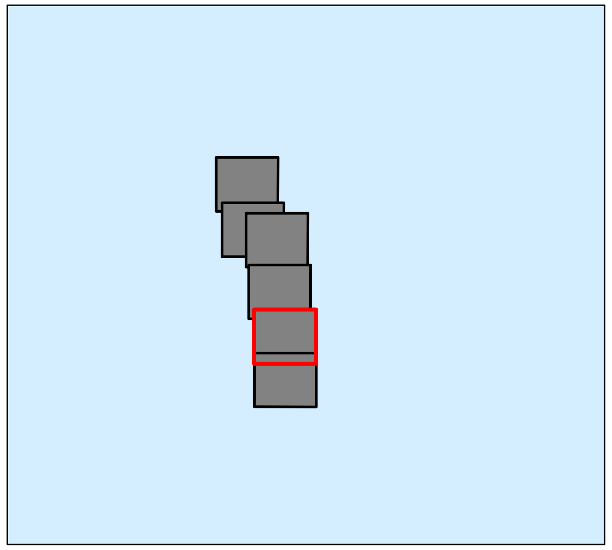
⊙ %XVLQHVV DQG ,QGXVWU\

%XLOGLQJ 8VH 3ULPH

● 5HVLGHQFH

● &RPPHUFLDO 5HWDLO

● 8QNQRZQ



Đ:;	ćĕĦ<:<>	ĀĉČ ČÿĐăÿđ	ćč	ĊČ	Ąþ	þą
ČęĪ	þĕĪę	ĊĪĦĤġħę ġĔ ĦęĪĵħĵġĜ	þĦĕĪĜ	ýĜęėĕĵ)Ę	ČęĪ)Ę	ûĤĤĦ)Ę

ýĵĵęĜĪ

þęħĵĕĜęĦ

ć ęĦĦĵġĜ Ăġ ĪħęĦ ć ęĦĦĵġĜ ČĘĦ þ ĪĖĵĵĜ >#
ăĦęĜĕĜĘĦ þ:> Č<ý?! Ďę" ©=?= ;<@C?@@@
Ī Ī Ī!ĵĕėġĖħ!ėġ ġ

ĊĦġĵęėĪ

A@C> ÿûčĎ ýĉûčĎ ČûăĆđûē
ăĈĀČûčĎČďýĎďČÿ ĊČĉĎÿýĎăĉĈ ĊČĉĄÿýĎč

þĦĕ ĪĵĜĕ ĎĵĪĵę

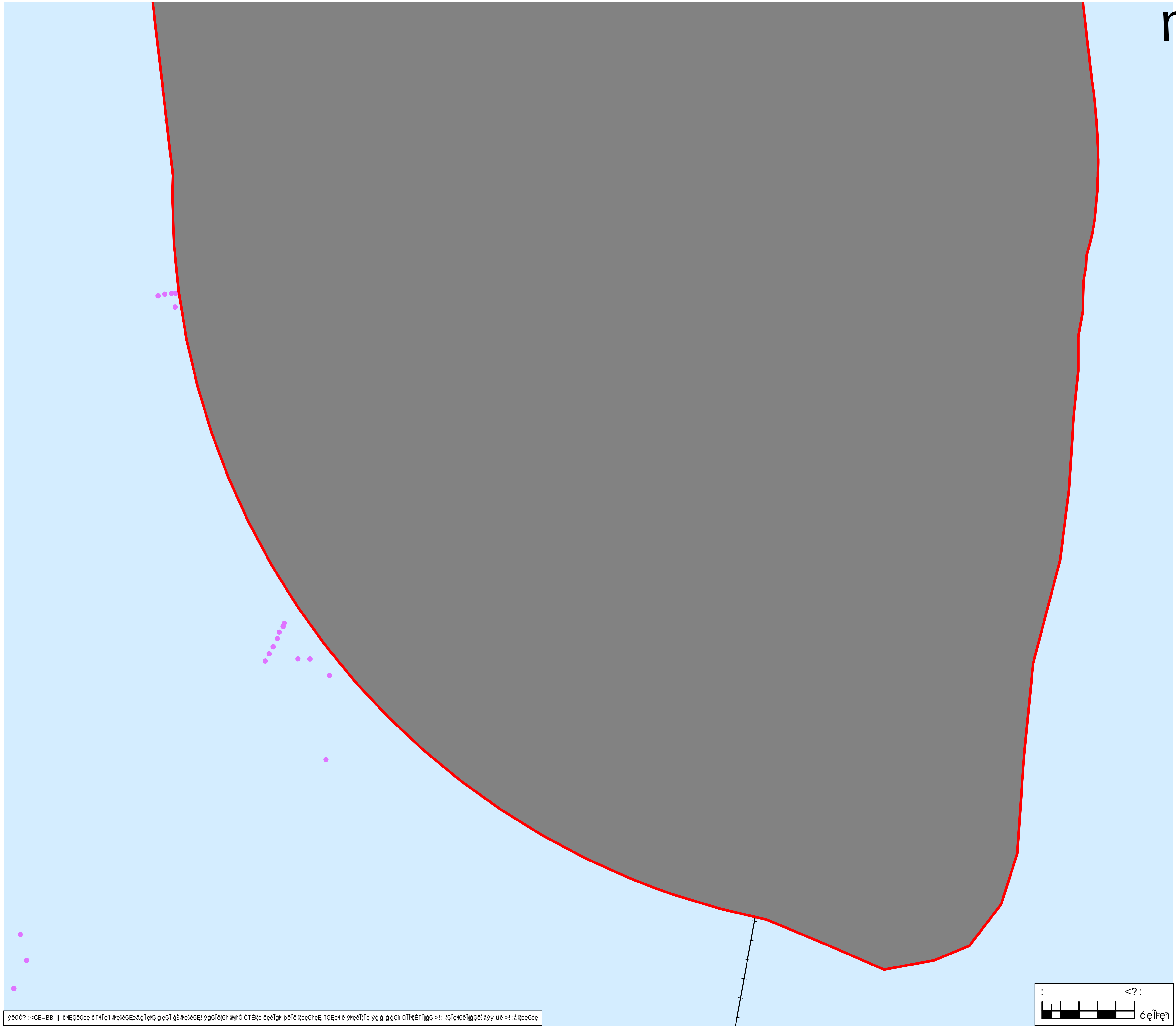
Āĵĕ ĪĦę <!;
ýýû@!; Ý ÿĜĪĵĦġĜ ġ ęĜĪĕĵ ýġĜħĪĦĕĵĜĪħ Ý ĊġĤĪĵĕĪĵġĜ ýġĜħĪĦĕĵĜĪħ
äĊĕĕę ? ġĔ @å

'UDZLQJ 6WDWXV ăččďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĪĕĪę ýġĘę	ĊĈĕħę <	
čėĕĵę Ì û=	;"; :#: : :	þĉ ĈĉĎ čýûĆÿ
ĄĕėġĖħ Ĉġ!	þ=@?B=: ;	ČęĪ Đ: ;
ýĵĵęĜĪ Ĉġ!	B:C=	
þĦĕ ĪĵĜĕ Ĉġ!	&&$ B 3 ':* (9 -$&	

ĳ ýġĤĪĦĵĕĈĪ <:<= Ąĕėġĕħ ÿĜĕĵĜęęĦĵĜĕ ăĦęĵĕĜĘ Ćĵ ġ ĵĪęĘ! ĎĈę ėġĜėęĤĪħ ĕĜĘ ĵĜĔġĦ ġĕĪĵġĜ ėġĜĪĕĵĜęĘ ĵĜ ĪĈĵħ Ęġė Ī ġ ęĜĪ ĕĦę ĪĈę ĤĦġĤęĦĪĪ ġĔ Ąĕėġĕħ! ďħę ġĦ ėġĤĪĵĜĕ ġĔ ĪĈĵħ Ęġė Ī ġ ęĜĪ ĵĜ ĪĈġĵę ġĦ ĵĜ ĤĕĦĪ ĪĵĪĈġĪĪ ĪĈę ĪĦĵĪĪęĜ ĤęĦ ġĵħħĵġĜ ġĔ Ąĕėġĕħ ėġĜħĪĵĪ Īęħ ĕĜ ĵĜĔĦĵĜĕęĕ ġ ęĜĪ ġĔ ėġĤĪĦĵĕĈĪ! Ćĵ ġ ĵĪĕĪĵġĜ" ĎĈĵħ ĘĦĕĪĵĜĕ Ĉĕħ ĘęęĜ ĤĦęĤĕĦęĘ ġĜ ĘęĈĕĵĔ ġĔ ĕĜĘ Ĕġ ĪĈę ęĪĕĵħĵĪę ĪħęĦ ġĔ Ąĕėġĕħ) ýĵĵęĜĪ ĕĜĘ ĵħ ħĪĘĵęĪ Īġ ĕĜĘ ĵħħĪęĘ ĵĜ ĕėėġĦĘĕĜėę ĪĵĪĈ ĪĈę ĤĦġĪĵħĵġĜħ ġĔ ĪĈę ėġĜĪĦĕėĪ ĘęĪĪęęĜ Ąĕėġĕħ ĕĜĘ ĪĈę ýĵĵęĜĪ! Ąĕėġĕħ ĕėėęĤĪħ Ĝġ ĵĵĕĘĵĵĵĪĪ ġĦ ĦęħĤġĜħĵĘĵĵĵĪĪ ĪĈĕĪħġęĪęĦ ĘġĦ ġĦ ĵĜ ĦęħĤęėĪ ġĔ ĕĜĪ Īħę ġĔ ġĦ ĦęĵĵĕĜėę ĪĤġĜ ĪĈĵħ ĘĦĕĪĵĜĕ ĘĪ ĕĜĪ ĪĈĵĦĘ ĤĕĦĪĪ!

ĊĕĪĈ" ççĕĖĵġĜ: Īħ: ; çęĵħĤĦġĵç þ=@?B=: : ãÿýČăĊĊçûĦĕ ăčç: ; ĊãÿĜĪĵĦġĜ ġ ęĜĪĕãýġĜħĪĦĕĵĜĪħãČęĤġĦĪç: : <ãĊġĤĪĵĕĪĵġĜãĕĜĘãĀĪ ġ ĕĜãĀęĕĵĪĈç: : <ãĀĵĕĪĦęã<!; ãýýû@ã;!ĕĤĦĪ



ýĕûĈ?:<CB=BB ij [illegible]

ÂÅÃÑÎÁ

/HJHQG

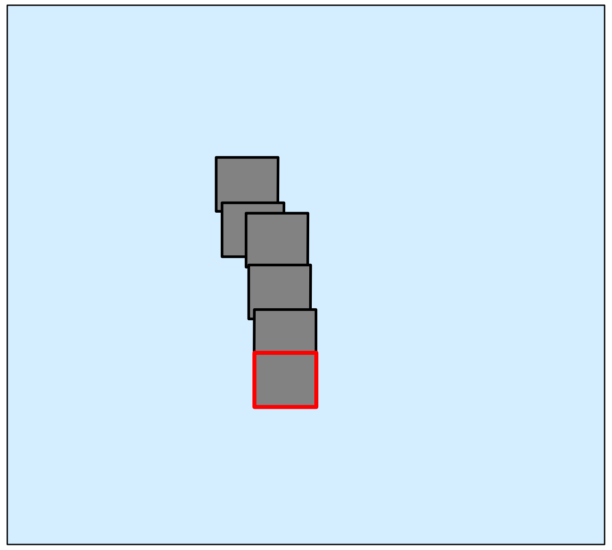
🟥	&&$ 6WXG\ $UHD
┼	5DLOZD\ 1HWZRUN &HQWUHOL

3ULPH 'DWD

☆	%RUG)DLOWH $FWLYLWLHV
✱	&RPPXQLW\ 6SRUWV DQG <RXW
△	5HOLJLRXV DQG 3ODFHV RI :R
🌲	3DUNV DQG 5HFUHDWLRQ
◉	%XVLQHVV DQG ,QGXVWU\

%XLOGLQJ 8VHV 3ULPH

●	5HVLGHQFH
●	&RPPHUFLDO 5HWDLO
●	8QNQRZQ



Đ:;	ćĕĦ<:<>	ĀĉČ ČÿĐăÿđ	ćč	ĊČ	Ąþ	þą
ČęĪ	þĕĪę	ĊĪĦĤġħę ġĚ ĦęĪĝħĝġĢ	þĦĕĪĢ	ýĜęėğ)Ę	ČęĪ)Ę	ûĤĤĦ)Ę

ýĝęĢĪ

þęħĝĕĢęĦ

ć ęĦĦĝġĢ Ăġĩħę ć ęĦĦĝġĢ ČĘ þĩĖĝĜĝ >
ăĦęĜĕĢĘ þ:>Č<ý?! Ďę" ©=?= ;<@C?@@@
ĩ ĩ ĩ!ĝĕėġĖħ!ėġ ġ

ĊĦġĝęėĪ

A@C> ÿûčĎ ýĉûčĎ ČûăĆđûē
ăĈĀČûčĎČďýĎďČÿ ĊČĉĎÿýĎăĉĈ ĊČĉĄÿýĎč

þĦĕĩĝĢĘ ĎĝĪĜę

Āĝĕ ĩĦę <!;
ýýû@!; Ý ÿĢĪĝĦġĢ ġ ęĢĪĕĝ ýġĢħĪĦĕĝĢĪħ Ý ĊġĤĩĕĪĝġĢ ýġĢħĪĦĕĝĢĪħ
äĈĕĕę @ ġĚ @å

'UDZLQJ 6WDWXV ăčćďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĪĕĪę ýġĘę	ĊĈĕĦę <		
čėĕĕę Ì û=	;";:#:::	þĉ ĈĉĎ čýûĆÿ	
ĄĕėġĖħ Čġ!	þ=@?B=:;	ČęĪ	Đ:;
ýĝęĢĪ Čġ!	B:C=		
þĦĕĩĝĢĕ Čġ!	&&$ B 3 ':* (9 -$&		

ij ýġĤĩĦĝĕĜĪ <:<= ĄĕėġĖħ ÿĢĕĝĢęęĦĝĢĕ ăĦęĕĕĢĘ Ćĝġĝĭęė! [illegible]

ČĕĪĜ"ççĕĖĕĝĢ:Īħ:;[illegible]

ýĕûČ?:<CB=BB ij ČĦĘĠĕĠęę ČĪĦĪęĪ ĦęĠĕĠĘ ýĠĜĪĦĘĠ ýĠĢĪĔĮĠĥ ĦĦĠ ČĪĔĠĕ ĕęĕĪĠĦ þĕĪĕ ĠĕęĠĥęĘ ĪĠĘĘĦ ě ýĦęĕĪĠĪę ýĠĠ ĠĠĠĥ ûĪĪĦĘĪĨĠĠ >!: ĦĠĪĦĠĕĪĠĠĕ ăýý ûĕ >!: å ĠĕĠęĠĕę

m

ÂÅÃÑÎÁ

/HJHQG

🟥 &&$ 6WXG\ $UHD

┼ 5DLOZD\ 1HWZRUN &HQWUHOLQ

3ULPH 'DWD

☆ %RUG)DLOWH $FWLYLWLHV

✱ &RPPXQLW\ 6SRUWV DQG <RXW

△ 5HOLJLRXV DQG 3ODFHV RI :R

5DUNV DQG 5HFUHDWLRQ

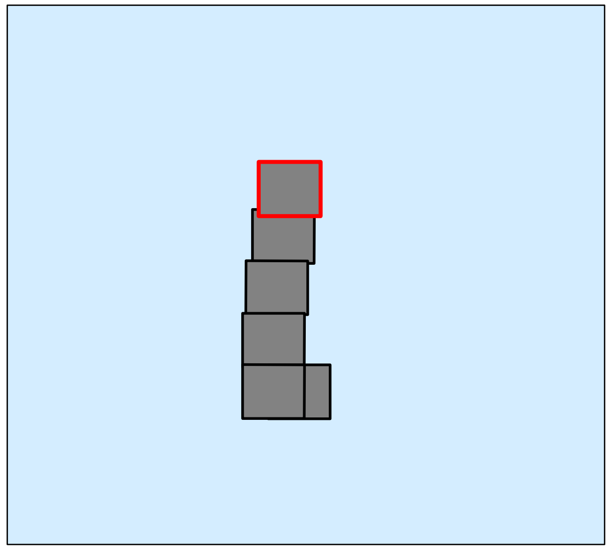
⊙ %XVLQHVV DQG ,QGXVWU\

%XLOGLQJ 8VH 3ULPH

● 5HVLGHQFH

● &RPPHUFLDO 5HWDLO

● 8QNQRZQ



Đ:;	ćĕĦ<:<>	ĀĉČ ČÿĐăÿđ	ćč	ĊČ	Ąþ	þą
Čęī	þĕĪę	ĊĪĦĤġħę ġĔ ĦęĪġħġġĢ	þĦĕīĢ	ýĜęėğ)Ę	ČęĪ)Ę	ûĤĤĦ)Ę

ýĠġęĢĪ

þęħġĕĢęĦ

ć ęĦĦġġĢ Ăġĩħę ć ęĦĦġġĢ ČĘ þĩĖġġĢ >
ăĦęĠĕĢĘ þ:> Č<ý?! Ďęĝ" ©=?= ;<@C?@@@
ī ī ī!ĠĕėġĔħ!ėġ ġ

ĊĦġĝęėĪ

A@C> ÿûčĎ ýĉûčĎ ČûăĆđûē
ăĈĀČûčĎČďýĎďČÿ ĊČĉĎÿýĎăĉĈ ĊČĉĄÿýĎč

þĦĕīġĢĕ ĎġĪĜę

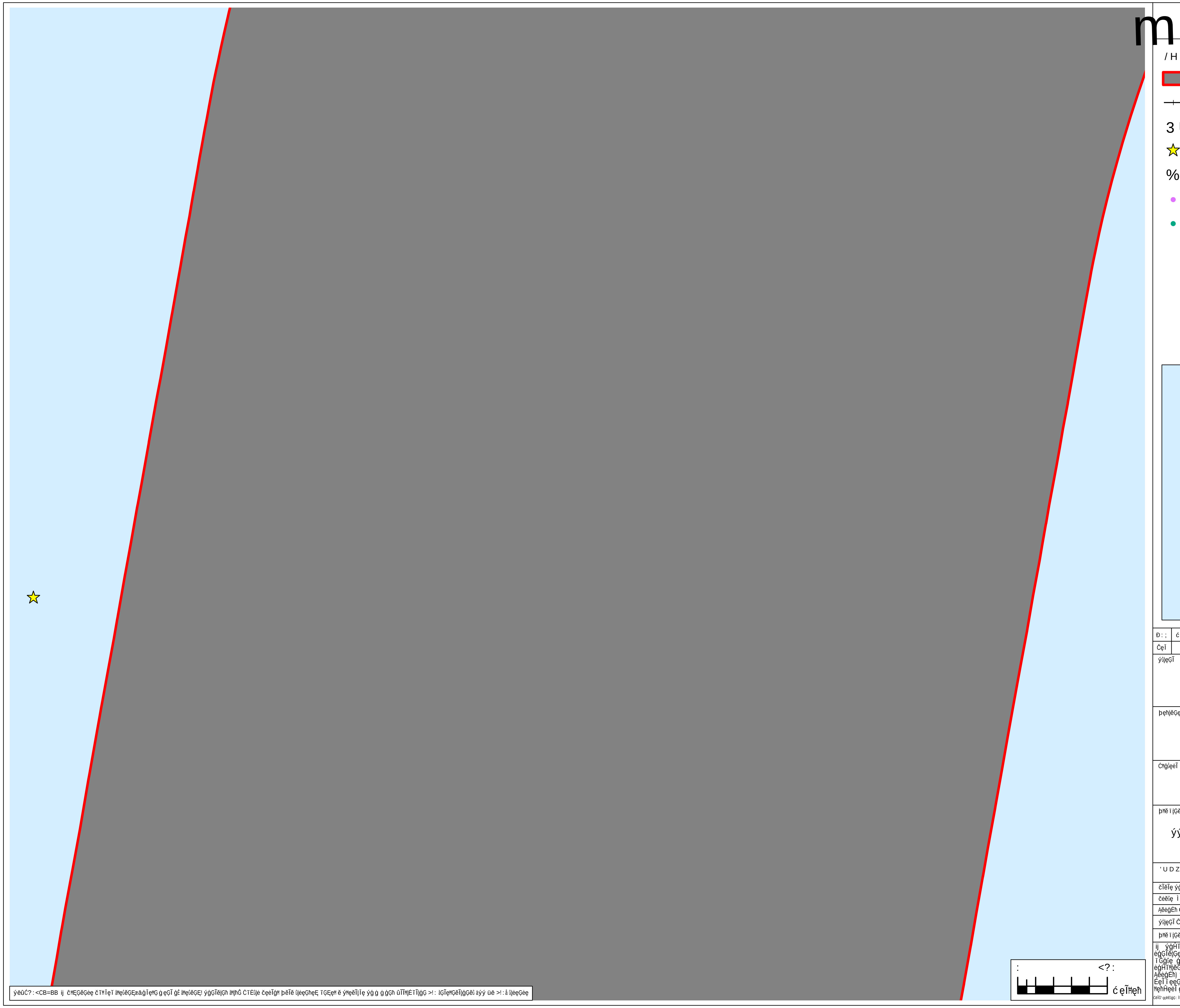
Āġĕ ĩĦę <!;
ýýû@!<Ý ÿĢĪġĦġĢ ġ ęĢĪĕġ ýġĢħĪĦĕġĢĪħ Ý ĊġĤĩĕĪġġĢ ýġĢħĪĦĕġĢĪħ
äČĕėę ; ġĔ @å

'UDZLQJ 6WDWXV ăčďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĪĕĪę ýġĘę	ĊĜĕħę <	
čėĕĠę Ì û=	;"; :#: : :	þĉ ĈĉĎ čýûĆÿ
ĄĕėġĔħ Ĉġ!	þ=@?B=: ;	Čęī Đ: ;
ýġġęĢĪ Ĉġ!	B:C=	
þĦĕīġĢĕ Ĉġ!	&&$ B 3 ':* (9 -$&	

ij ýġĤĩĦġĕĠĪ <:<= ĄĕėġĔħ ÿĢĕġĢęęĦġĢĕ ăĦęĠĕĢĘ Ĉġġ ġĪęĘ! ĎĜę ėġĢėęĤĪħ ĕĢĘ ġĢĔġĦġĕĪġġĢ ėġĢĪĕġĢęĘ ġĢ ĪĜġħ ĘġėĩġęĢĪ ĕĦę ĪĜę ĦġĤĦęĦĪĪ ġĔ Ąĕėġĩħ! ďħę ġĦ ėġĤĭġĢĕ ġĔ ĪĜġħ Ęġėīġ ęĢĪ ġĢ īĜġĠę ġĦ ġĢ ĤĕĦĪ īġĪĜġīĪ ĪĜę īĦġĪĪęĢ ĤęĦġġħħġġĢ ġĔ Ąĕėġĩħ ėġĢħĪġĪīĪęħ ĕĢ ġĢĔĦġĢĕęġęĢĪ ġĔ ėġĤĭĦġĕĠĪ! Čġġġĕĕġġġ" ĎĜġħ ĘĦĕīġĢĕ Ĝĕħ ĘęęĢ ĤĦęĤĕĦęĘ ġĢ ĕėėġĦĘĕĢėę īġĪĜ ĪĜę ġĕġęĢĪġġġĢ ĕĢĘ ĔġĦ ĪĜę ĩħę ġĔ Ąĕėġĩħ) ýġĢĕġĪĕĢĪ ĕĢĘ ġħ ħĩĕĠęėĪ Īġ ĕĢĘ ġħħĩęĘ ġĢ ėġĢĢęėĪġġĢ īġĪĜ ĪĜę ĪęĦġħ ġĔ ĪĜę ėġĢĪĦĕėĪ ĘęĪīęęĢ Ąĕėġĩħ ĕĢĘ ĪĜę ýġĢĕġĪ! Ąĕėġĩħ ĕėėęĤĪħ Ģġ ĦęħĤġĢħġĘġĠġĪĭ ġĦ ĦęĤĦęħęĢĪĕĪġġĢ ĔġĦ ġĦ ġĢ ĦęħĤęėĪ ġĔ ĕĢĭ ĪĜġĦĘ ĤĕĦĪĭ ĕĢĭ īĜġ ĦęĠġęħ ġĢ ĪĜġħ ĘĦĕīġĢĕ ĘĭĕĢĭ ĪĜġĦĘ ĤĕĦĪĭ!

ČĕĪĜ" ççĕĖĉġĢ: Īħ: ;çĕġħĤĦġĜçþ=@?B=: : ăÿýČăČČçûĦĕăăčç: ;CăÿĢĪġĦġĢ ġ ęĢĪĕăýġĢħĪĦĕġĢĪħăČęĤĩĦĪç: :<ăČġĤĩĕĪġġĢăĕĘĢĕăĄĪ ġ ĕĢăĄęĕĕĪĜç: :<ăĀġĕĪĦęă<!;ăýýû@ă<!ĕĤĪ



ýēûĆ?:<CB=BB ĳ ĉĦĘǤĕǤėę čĩĦĪęĭ ăĦęĠĕǤĘæāġĪęĦǤ ġ ęǤĪ ġĚ ăĦęĠĕǤĘ! ýġǤĪĕĝǤħ ăĦĝħĜ ĊĩĖĠĝė čęėĪġĦ þĕĪĕ ĠĝėęǤħęĘ ĩǤĘęĦ ĕ ýĦęĕĪĝĪę ýġġ ġġǤħ ûĪĪĦĝĖĩĪĝġǤ >!: ăǤĪęĦǤĕĪĝġǤĕĠ äýý üē >!:å ĠĝėęǤėę

ÂÅÃÑÎÁ

/HJHQG

🟥 &&$ 6WXG\ $UHD

— 5DLOZD\ 1HWZRUN &HQWUHOL

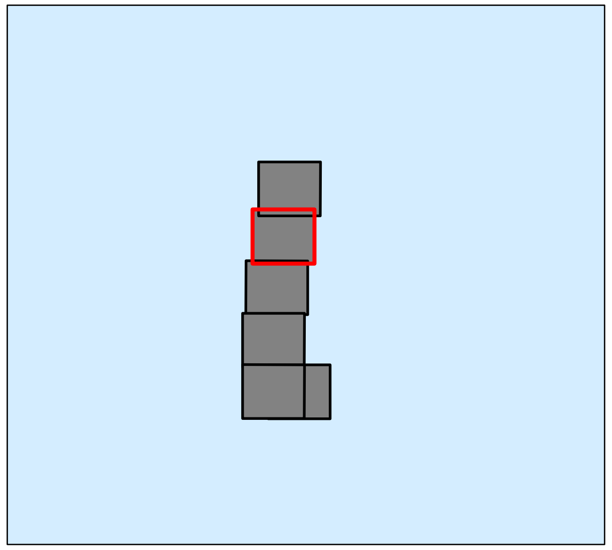
3ULPH 'DWD

☆ %RUG)DLOWH $FWLYLWLHV

%XLOGLQJ 8VHV 3ULPH

● 5HVLGHQFH

● 8QNQRZQ



Ð:;	ćĕĦ<:<>	ĀĉČ ČÿĐăÿđ	ćč	ĊČ	Ąþ	þą
ČęĪ	þĕĪę	ĊĩĦĤġħę ġĚ ĦęĪĝħĝġǤ	þĦĕĩǤ	ýĜęėĞ)Ę	ČęĪ)Ę	ûĤĤĦ)Ę

ýĝĝęǤĪ

þęħĝĕǤęĦ

ćęĦĦĝġǤ ĂġĩĦę# ćęĦĦĝġǤ ČĘ# þĩĖĠĝǤ >#
ăĦęĠĕǤĘ# þ:> Č<ý?! ĎęǤ" ©=?= ;<@C?@@@
ĭ ĭ ĭ!ĠĕėġĘĕħ!ėġ ġ

ĊĦġĠęėĪ

A@C> ÿûčĎ ýĉûčĎ ČûăĆđ ûē
ăĈĀČûčĎČďýĎďĊÿ ĊČĉĎÿýĎăĉĈ ĊČĉĄÿýĎč

þĦĕĭĝǤĕ Ďĝĩħę

Āġĕ ĪĦę <!;
ýýû@!<Ý ÿǤĪĝĦġǤ ġ ęǤĪĕĠ ýġǤħĪĦĕĝǤĪħ Ý ĊġĤĭĠĕĪĝġǤ ýġǤħĪĦĕĝǤĪħ
äĊĕĕę < ġĚ @å

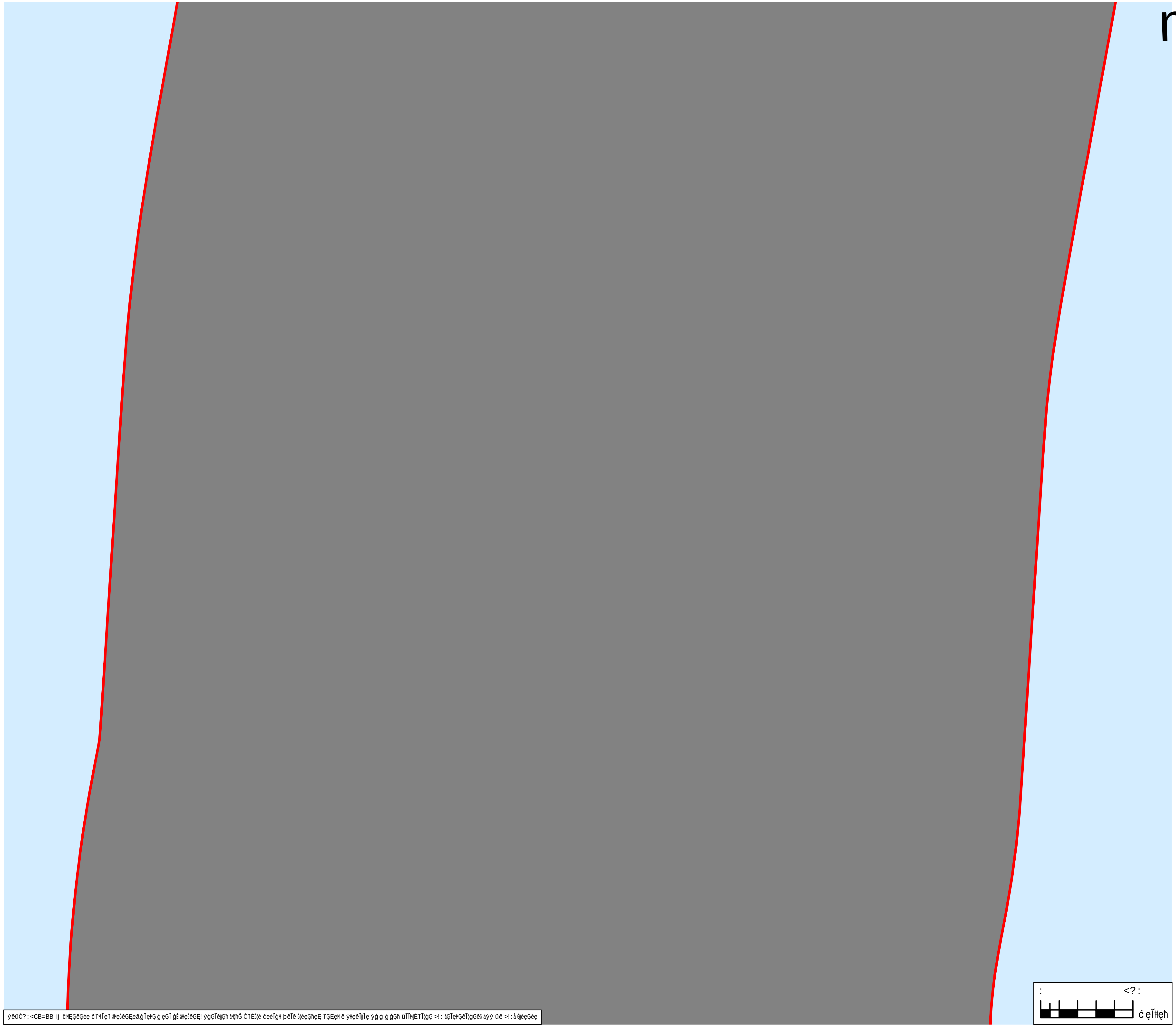
'UDZLQJ 6WDWXV ăččďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĪĕĪę ýġĘę	ĊĜĕħę <	
čėĕĠę Ì û=	;";:#:::	þĉ ĈĉĎ čýûĆÿ
ĄĕėġĖħ Ĉġ!	þ=@?B=:;	ČęĪ Ð:;
ýĝĝęǤĪ Ĉġ!	B:C=	
þĦĕĭĝǤĕ Ĉġ!	&&$ B 3 ':* (9 -$&	

ĳ ýġĤĭĦĝĕĜĪ <:<= ĄĕėġĖħ ÿǤĕĝǤęęĦĝǤĕ ăĦęĠĕǤĘ ĈġĪĝęĘ! ĎĜę ėġǤėęĤĪħ ĕǤĘ ĝǤĚġĦĠĕĪĝġǤ ėġǤĪĕĝǤęĘ ĝǤ ĪĜĝħ ĘġėĩĠęǤĪ ĕĦę ĪĜę ĤĦġĤęĦĪĭ ġĚ ĄĕėġĖħ! ďħę ġĦ ėġĤĭĝǤĕ ġĚ ĪĜĝħ ĘġėĩĠęǤĪ ĝǤ ĭĜġĠę ġĦ ĝǤ ĤĕĦĪ ĭĝĪĜġĩĪ ĪĜę ĭĦĝĪĪęǤ ĤęĦĠĝħħĝġǤ ġĚ ĄĕėġĖħ ėġǤħĪĝĪĩĪęħ ĕǤ ĝǤĚĦĝǤĕęĠęǤĪ ġĚ ėġĤĭĦĝĕĜĪ! ĈġĪĝėę" ĎĜĝħ ĘĦĕĭĝǤĕ Ĝĕħ ĖęęǤ ĤĦęĤĕĦęĘ ġǤ ĖęĜĕĠĚ ġĚ# ĕǤĘ Ěġġ ĪĜę ęĴėĠĩħĝĪę ĩħę ġĚ ĄĕėġĖħ) ýĠĝęǤĪ# ĕǤĘ ĝħ ħĩĖĞęėĪ Īġ# ĕǤĘ ĝħħĩęĘ ĝǤ ĕėėġĦĘĕǤėę ĭĝĪĜ# ĪĜę ĤĦġĪĝħĝġǤħ ġĚ ĪĜę ėġǤĪĦĕėĪ ĖęĪĭęęǤ ĄĕėġĖħ ĕǤĘ ĪĜę ýĠĝęǤĪ! ĄĕėġĖħ ĕėėęĤĪħ Ǥġ ĠĝĕĖĝĠĝĪĭ ġĦ ĦęħĤġǤħĝĖĝĠĝĪĭ ĭĜĕĪħġęĪęĦ Ěġĸ ġĦ ĝǤ ĦęħĤęėĪ ġĚ# ĕǤĭ ĭħę ġĚ# ġĦ ĦęĠĝĕǤėę ĭĤġǤ# ĪĜĝħ ĘĦĕĭĝǤĕ Ėĭ ĕǤĭ ĪĜĝĦĘ ĤĕĦĪĭ!

ĊĕĪĜ" ççĕĘĝġǤ:Īħ:;çĕĝħĤĦġĘçþ=@?B=::ãÿýČăĊĊçûĦėăăčç:;Cãÿ ĊĪĝĦġǤġęǤĪĕĠýġǤħĪĦĕĝǤĪħãČęĤġĦĪç::<ãĊġĤĭĠĕĪĝġǤãĕǤĘãĀĩĪĝĠĕǤĘĪĜç::<ãĀġĕĪĦęã<!;ãýýû@ã<!ĕĤĦĭ

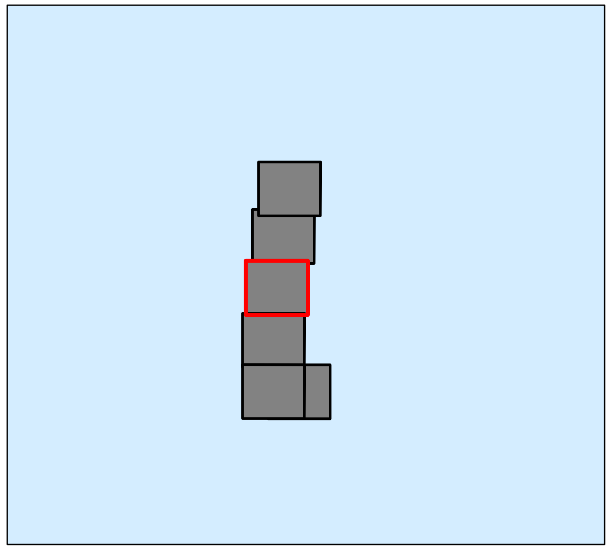
ÂÅÃÑÎÁ



ÿėûĆ?:<CB=BB ij [illegible]

/HJHQG

- 🟥 &&$ 6WXG\ $UHD
- ─┼─ 5DLOZD\ 1HWZRUN &HQWUHOLQH
- %XLOGLQJ 8VHV 3ULPH
- ● 5HVLGHQFH



Đ:;	ćěĦ<:<>	ĀĉČ ČÿĐăÿđ	ćč	ĊČ	Ąþ	þą
ČęĪ	þěĪę	ĊĩĦĤġħę ġĚ ĦęĪĝħġġĢ	þĦěĩĢ	ýĜęėğ)Ę	ČęĪ)Ę	ûĤĤĦ)Ę

ýĝęĢĪ

þęħĝěĢęĦ

ć ęĦĦĝġĢ Ăġĩħę# ć ęĦĦĝġĢ ČĘ# þĩĖĝĝĢ >#
ăĦęĜěĢĘ# þ:> Č<ý?! Ďę" ©=?= ;<@C?@@@
ĩ ĩ ĩ!ĜěėġĖħ!ėġ ġ

ĊĦġĜęėĪ

A@C> ÿûčĎ ýĉûčĎ ČûăĆđûē
ăĈĀČûčĎČďýĎďČÿ ĊČĉĎÿýĎăĉĈ ĊČĉĄÿýĎč

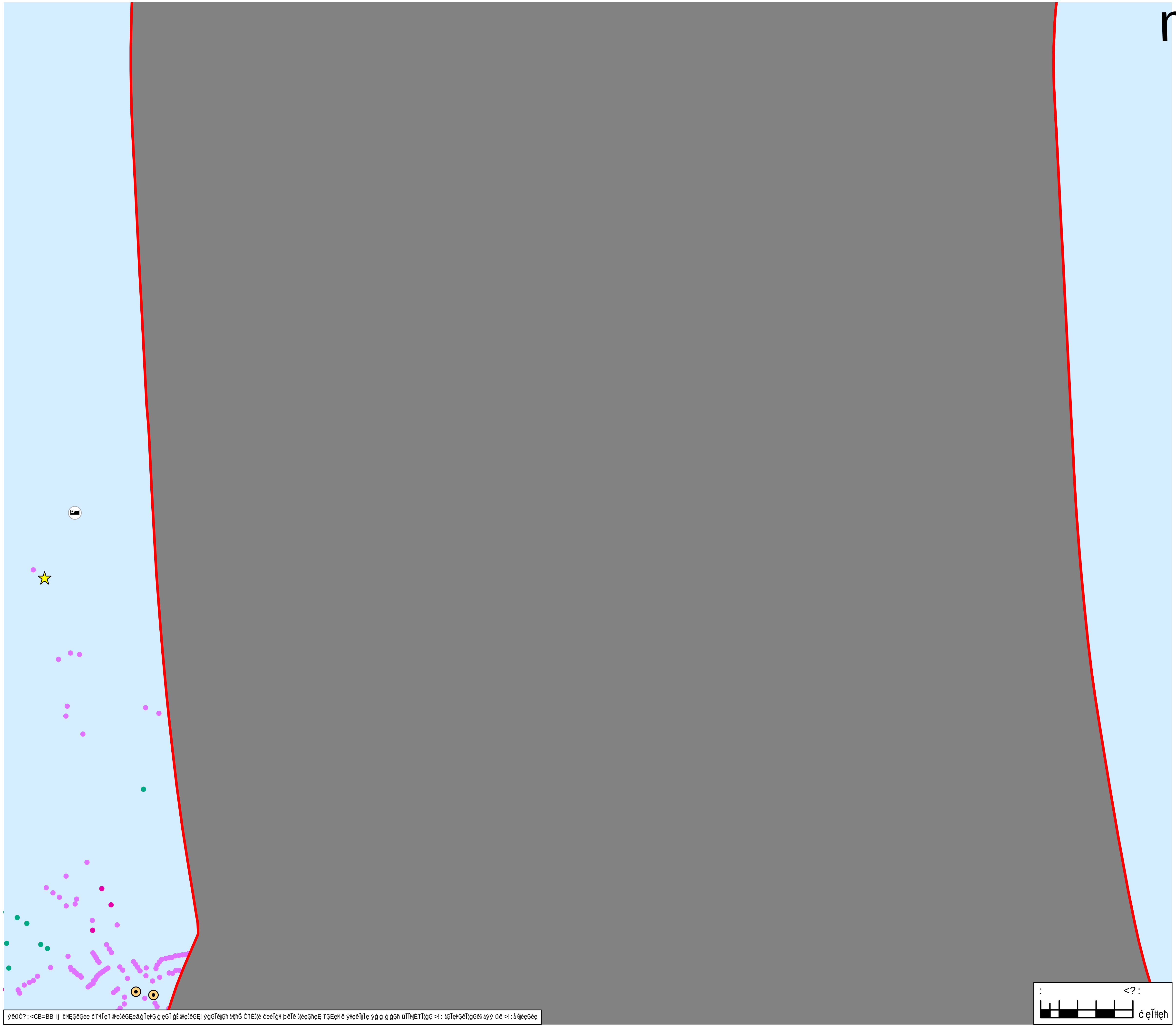
þĦěĩĝĢě ĎĝĪĜę

Āĝěĩħę <!;
ýýû@!<Ý ÿĢĪĝĦġĢ ġ ęĢĪěĜ ýġĢħĪĦěĝĢĪħ Ý ĊġĤĩĜěĪĝġĢ ýġĢħĪĦěĝĢĪħ
äČěěę = ġĚ @å

'UDZLQJ 6WDWXV ăččďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĪěĪę ýġĘę	ĊĜěħę <		
čėěĜę Ì û=	;";:#:::	þĉ ĈĉĎ čýûĆÿ	
ĄěėġĖħ Ĉġ!	þ=@?B=:;	ČęĪ	Đ:;
ýĝęĢĪ Ĉġ!	B:C=		
þĦěĩĝĢě Ĉġ!	&&$ B 3 ':* (9 -$&		

[illegible]



ÂÅÃÑÎÁ

/HJHQG

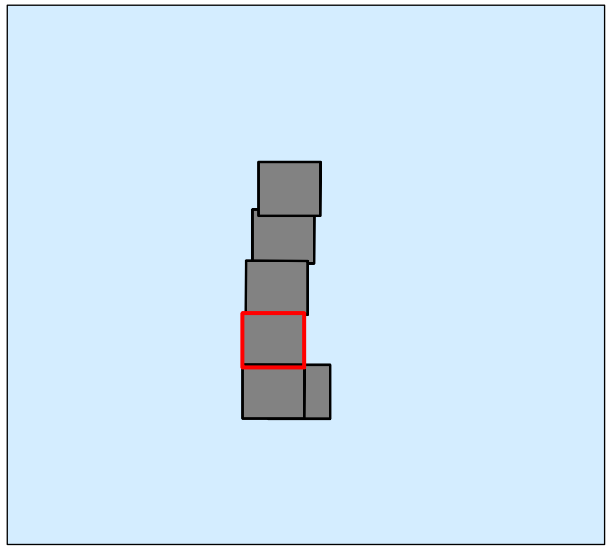
🟥	&&$ 6WXG\ $UHD
─┼─	5DLOZD\ 1HWZRUN &HQWHUOLQ

3ULPH 'DWD

☆	%RUG)DLOWH $FWLYLWLHV
🛏	%RUG)DLOWH $FFRPRGDWLR
⊙	%XVLQHVV DQG ,QGXVWU\

%XLOGLQJ 8VHV 3ULPH

●	5HVLGHQFH
●	&RPPHUFLDO 5HWDLO
●	8QNQRZQ



Ð : ;	ćĕĦ <:<>	ĀĉČ ČÿĐäÿ đ	ćč	ĊČ	Ąþ	þą
ČęĪ	þĕĪę	ĊĪĦĤġħę ģĔ ĦęĪĝħġģĢ	þĦĕ ī Ģ	ýĜęėğ)Ě	ČęĪ)Ě	ûĤĤĦ)Ě

ýĝęĢĪ

þęħĝĕĢęĦ

ć ęĦĦĝģĢ Ăģīħę ć ęĦĦĝģĢ ČĚ þ ī ĖĝģĢ >
ăĦęĜĕĢĚ þ : > Č<ý?! Ðęĝ" ©=?= ; <@C?@@@
ī ī ī !ĝĕėģĖħ!ėģ ġ

ĊĦģĝęėĪ

A@C> ÿûčĎ ýĉûčĎ ČûäĆđûē
ăĈĀČûčĎČďýĎďČÿ ĊČĉĎÿýĎäĉĈ ĊČĉĄÿýĎč

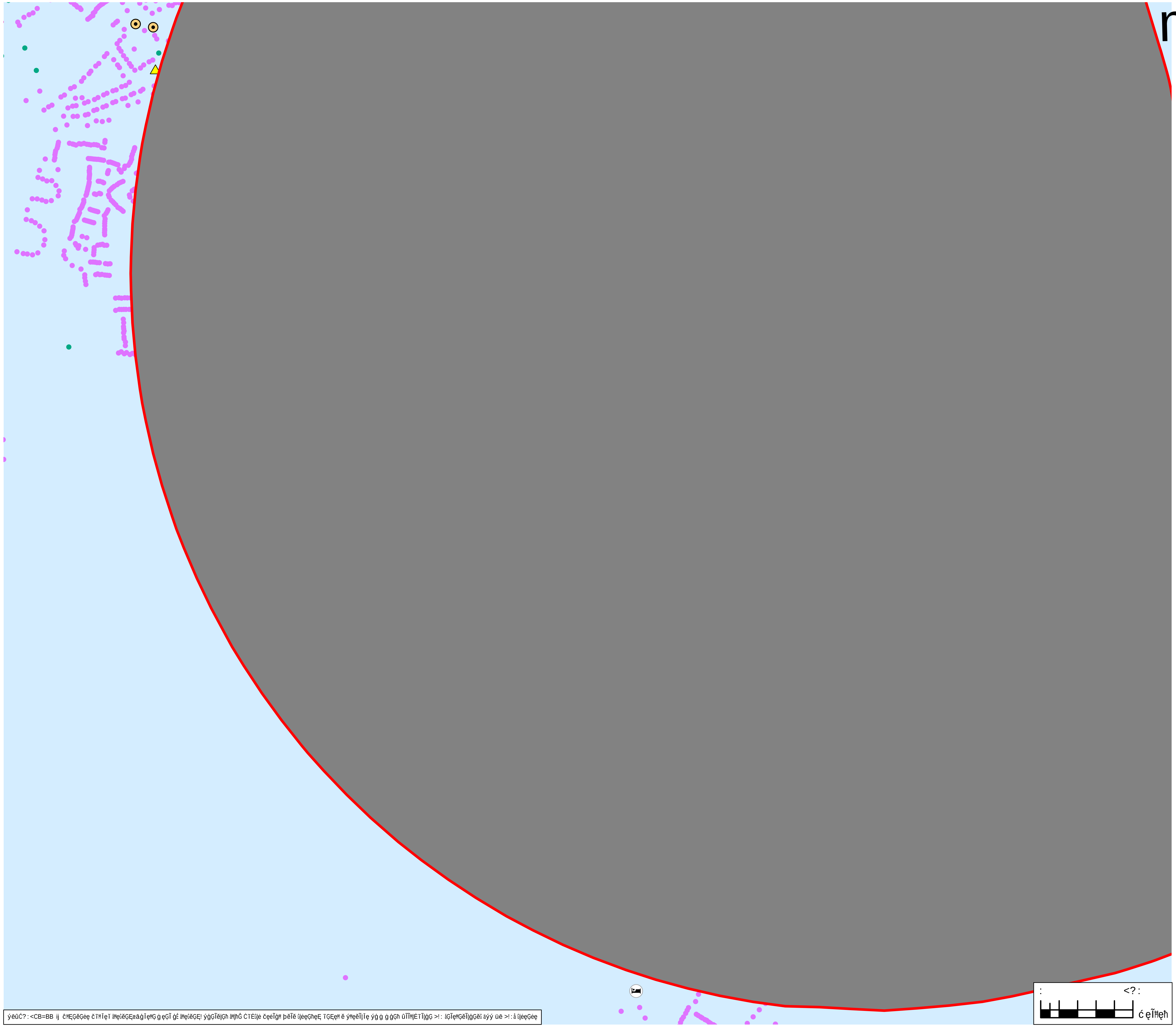
þĦĕ ī ĝĢĕ ĎĝĪĠę

Āĝĕ ī Ħę <! ;
ýýû@!<Ý ÿĢĪĝĦġĢ ġ ęĢĪĕĠ ýġĢħĪĦĕĝĢĪħ Ý ĊġĤīĠĕĪĝġĢ ýġĢħĪĦĕĝĢĪħ
äĊĕěę > ģĚ @å

'UDZLQJ 6WDWXV ăčďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĪĕĪę ýģĚę	ĊĜĕħę <	
čėĕĠę Ì û=	;"; :#: : :	þĉ ĈĉĎ čýûĈÿ
Ąĕėģĕħ Ĉģ!	þ=@?B=: ;	ČęĪ Ð : ;
ýģĝęĢĪ Ĉģ!	B:C=	
þĦĕ ī ĝĢĕ Ĉģ!	&&$ B 3 ':* (9 -$&	

[illegible]



ÿêûĈ?:<CB=BB ĳ ĉĦĘĞĞęę ĉĪĦĪęĪ [illegible]

ÂÅÃÑÎÁ

/HJHQG

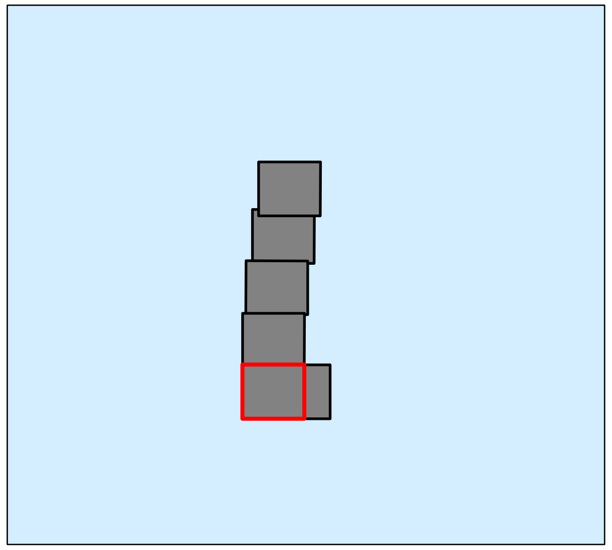
- 🟥 &&$ 6WXG\ $UHD
- 5DLOZD\ 1HWZRUN &HQWUHOLQH

3ULPH 'DWD

- ☆ %RUG)DLOWH $FWLYLWLHV
- %RUG)DLOWH $FFRPRGDWLRQ
- ✱ &RPPXQLW\ 6SRUWV DQG <RXWK &HQWUHV
- △ 5HOLJLRXV DQG 3ODFHV RI :RUVKLS
- ● (GXFDWLRQ DQG (QWHUSULVH
- 3DUNV DQG 5HFUHDWLRQ
- ● %XVLQHVV DQG ,QGXVWU\

%XLOGLQJ 8VHV 3ULPH

- ● 5HVLGHQFH
- ● &RPPHUFLDO 5HWDLO
- ● 8QNQRZQ
- ♦ 3ULPDU\ 6FKRRO
- ♦ 6HFRQGDU\ 6FKRRO
- ♦ 0RQWHVVRUL 6FKRRO



Đ:;	ćĕĦ<:<>	ĀĉČ ČÿĐăÿđ	ćč	ĊČ	Ąþ	þą
ČęĪ	þĕĪę	ĊĪĦĤġħę ġĔ ĦęĪĝħġġĜ	þĦĕ Ī Ĝ	ýĜęėğ)Ę	ČęĪ)Ę	ûĤĤĦ)Ę

ýĝęĜĪ

þęħĝĕĜęĦ

ć ęĦĦĝġĜ Āġīħę# ć ęĦĦĝġĜ ČĘ# þĪĖĝĝĜ >#
ăĦęĜĕĜĘ# þ:> Č<ý?! Đę" ©=?= ;<@C?@@@
Ī Ī Ī!ĜĕėġĖħ!ėġ ġ

ĊĦġĜęėĪ

A@C> ÿûčĎ ýĉûčĎ ČûăĆđûē
ăĈĀČûčĎČďýĎďČÿ ĈČĉĎÿýĎăĉĈ ĈČĉĄÿýĎč

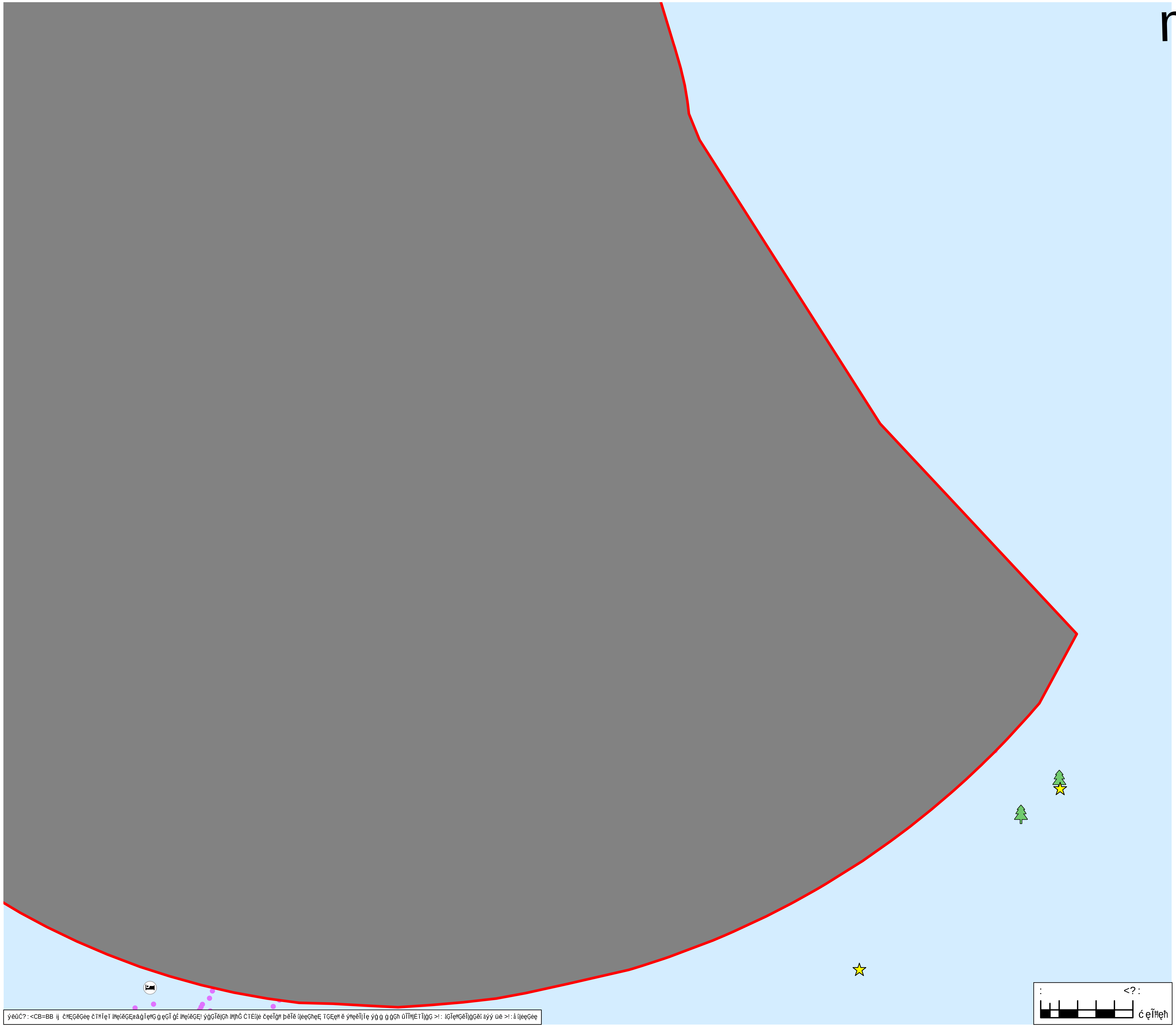
þĦĕ ĪĝĜĕ ĎĝĪĜę

Āĝĕ ĪĦę <!;
ýýû@!<Ý ÿĜĪĝĦġĜ ġ ęĜĪĕĜ ýġĜħĪĦĕĝĜĪħ Ý ĊġĤĪĜĕĪĝġĜ ýġĜħĪĦĕĝĜĪħ
äĈĕĕę ? ġĔ @å

'UDZLQJ 6WDWXV ăččďÿ ĀĉČ ûýýÿĊĎûĈĉÿ

čĪĕĪę ýġĘę	ĊĜĕħę <		
čėĕĜę Ì û=	;"; :#: : :	þĉ ĈĉĎ čýûĈÿ	
ĄĕėġĖħ Ĉġ!	þ=@?B=:;	ČęĪ	Đ:;
ýĝęĜĪ Ĉġ!	B:C=		
þĦĕ ĪĝĜĕ Ĉġ!	&&$ B 3 ':* (9 -$&		

[illegible]



ÂÅÃÑÎÁ

/HJHQG

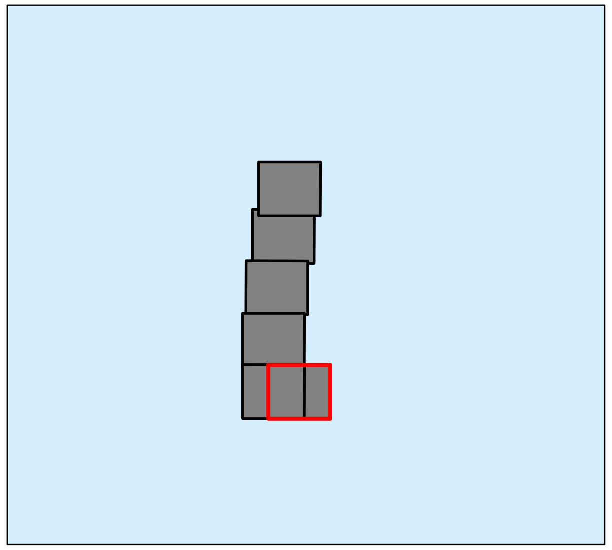
- 🟥 &&$ 6WXG\ $UHD
- → 5DLOZD\ 1HWZRUN &HQWUHOLQH

3ULPH 'DWD

- ☆ %LUG)ODLWH $FWLYLWLHV
- 🛏 %LUG)ODLWH $FFRPRGDWLRQ
- ✱ &RPPXQLW\ 6SRUWV DQG <RXWK &HQWUHV
- ⬠ &XOWXUDO)DFLOLWLHV
- 🟨 /LEUDULHV
- △ 5HOLJLRXV DQG 3ODFHV RI :RUVKLS
- ◉ (GXFDWLRQ DQG (QWHUSULVH
- 🌲 3DUNV DQG 5HFUHDWLRQ
- ◉ %XVLQHVV DQG ,QGXVWU\

%XLOGLQJ 8VHV 3ULPH

- ● 5HVLGHQFH
- ● &RPPHUFLDO 5HWDLO
- ● 8QNQRZQ
- ♦ 3ULPDU\ 6FKRRO
- ♦ 6HFRQGDU\ 6FKRRO
- ♦ 0RQWHVVRUL 6FKRRO



Đ:;	ćĕĦ<:<>	ĀĉČ ČÿĐăÿđ	ćč	ĊČ	Ąþ	þą
ČęĨ	þĕĨę	ĊĨĦĤġħę ġĚ ĦęĨĵħġġĜ	þĦĕĨĜ	ýĜęėĕ)Ę	ČęĨ)Ę	ûĤĤĦ)Ę

ýĵęĜĨ

þęħĵĕĜęĦ

ćęĦĦĵġĜ Ăġĭħę ćęĦĦĵġĜ ČĘ þĭĖĵĜ >
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ĊĦġĝęėĨ

A@C> ÿûčĎ ýĉûčĎ ČûăĆđûē
ăĈĀČûčĎČďýĎďČÿ ĊČĉĎÿýĎăĉĈ ĊČĉĄÿýĎč

þĦĕĭĵĜĕ ĎĵĨĝę

Āĵĕ ĭĦę <!;
ýýû@!<Ý ÿĜĨĵĦġĜ ġ ęĜĨĕġ ýġĜħĨĦĕĵĜĨħ Ý Ċġ Ĥ ĭĝĕĨĵġĜ ýġĜħĨĦĕĵĜĨħ
äĈĕĕę @ ġĚ @å

'UDZLQJ 6WDWXV ăččďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĨĕĨę ýġĘę	ĊĈĕħę <	
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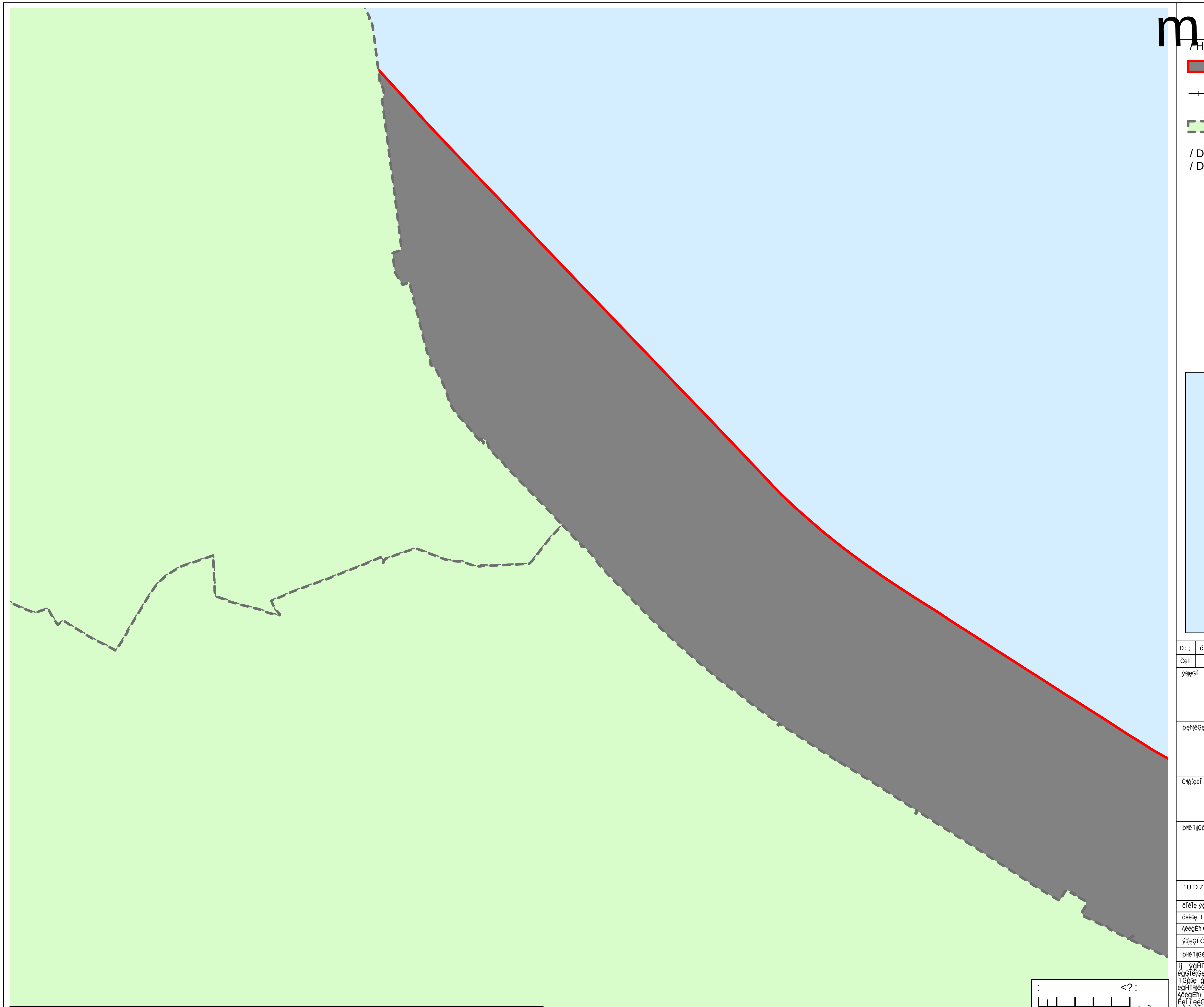
ĳ ýġĤĭĦĵĕĜĨ <:<= ĄĕėġĖħ ÿĜĕĵĜęęĦĵĜĕ ăĦęĉĕĜĘ ĈġĵĨęĘ! ĎĈę ėġĜėęĤĨħ ĕĜĘ ĵĜĚġĦĝĕĨĵġĜ ėġĜĨĕĵĜęĘ ĵĜ ĨĈĵħ ĘġėĭĝęĜĨ ĕĦę ĨĈę ĦĦġĤęĦĨĭ ġĚ ĄĕėġĖħ! ďħę ġĦ ėġĤĭĵĜĕ ġĚ ĨĈĵħ ĘġėĭĝęĜĨ ĵĜ ĭĈġĕę ġĦ ĵĜ ĤĕĦĨ ĭĵĨĈġĭĨ ĨĈę ĭĦĵĨĨęĜ ĤęĦĝĵħħĵġĜ ġĚ ĄĕėġĖħ ėġĜħĨĵĨĭĨęħ ĕĜ ĵĜĚĦĵĜĕęĝęĜĨ ġĚ ėġĤĭĦĵĕĨĨ! Ĉġ ġĵĕĖĵĵĵĨĭ DĈĕĵħ ĘĦĕĭĵĜĕ Ĉĕħ ĖęęĜ ĤĦęĤĕĦęĘ ġĜ ĖęĈĕĚ ġĚ ĕĜĘ Ěġĝ ĨĈę ęĬėĵĭħĵĭę ĭħę ġĚ ĄĕėġĖħ) ýĵęĜĨ# ĕĜĘ ĵħ ħĭĖĵęėĨ Ĩġ# ĕĜĘ ĵħħĭęĘ ĵĜ ĕėėġĦĘĕĜėę ĭĵĨĈ# ĨĈę ĤĦġĭĵħĵġĜħ ġĚ ĨĈę ėġĜĨĦĕėĨ ĖęĨĭęęĜ ĄĕėġĖħ ĕĜĘ ĨĈę ýĵęĜĨ! ĄĕėġĖħ ĕėėęĤĨħ Ĝġ ĵĵĕĖĵĵĵĨĭ ġĦ ĦęħĤġĜħĵĖĵĵĵĨĭ ĭĈĕĨħġęĭęĦ Ěġĕ# ġĦ ĦęħĤęėĨ ġĚ ĕĜĭ ĭħę ġĚ# ġĦ Ħęĵĵĕĝėę ĭĤġĜ# ĨĈĵħ ĘĦĕĭĵĜĕ Ėĭ ĕĜĭ ĨĈĵĦĘ ĤĕĦĨĭ!



ýêûĆ?:<CB=BB ĳ ĉĦĘĜěĜėę ĉĪĦĪęĪ ăĦęĉěĜĘæăĝĪęĦĜ ġ ęĜĪ ģĚ ăĦęĉěĜĘ! ýģĜĪěĝĜħ ăĦĝħĜ ĈĪĖĝė ĉęėĪĝĦ þěĪě ĝėęĜħęĘ ĪĜĘĘĦ ě ýĦęěĪĝĪę ýġġ ġġĜħ ûĪĪĦĖĪĪĝĜ >!: ăĜĪĘĦĜěĪĝĜĜĕ ăýý üě >!:å ĝėęĜėę

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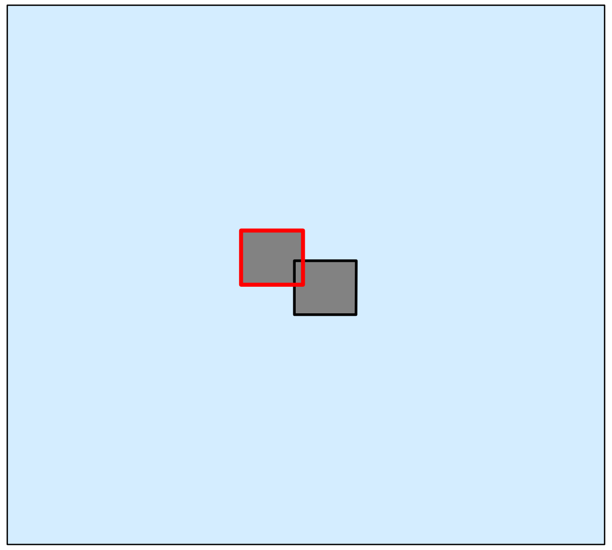

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ýĝęĜĪ

þęħĝěĜęĦ

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ăĦęĜěĜĘĦ þ:> Č<ý?! ĎęĜ" ©=?= ;<@C?@@@
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ĊĦġĜęėĪ

A@C> ÿûčĎ ýĉûčĎ ČûăĆđûē
ăĈĀČûčĎČďýĎďČÿ ĈČĉĎÿýĎăĉĈ ĈČĉĄÿýĎč

þĦě ĪĝĜě ĎĝĪĜę

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äĈěěę ; ġĔ <å

'UDZLQJ 6WDWXV | ăččďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĪěĪę ýġĘę	ĊĜěħę <	
čėěĜę Ì û=	;";:#:::	þĉ ĈĉĎ čýûĆÿ
ĄěėġĖħ Ĉġ!	þ=@?B=:;	ČęĪ Đ:;
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ĳ ýġĤĪĦĝěĜĪ <:<= ĄěėġĖħ ÿĜěĝĜęĦĝĜě ăĦęĜěĘ ĈĝġĝĪęĘ! ĎĜę ėġĜėęĤĪħ ěĘ ĝĜĝġĦġěĪĝĝĜ ėġĜĪěĝĜęĘ ĝĜ ĪĜĝħ Ęġėĭ ġ ęĜĪ ěĦę ĪĜę ĦĦġĤęĦĪĭ ġĔ ĄěėġĖħ! ďĦę ġĦ ėġĤĭĝĜě ġĔ ĪĜĝħ Ęġėĭ ġ ęĜĪ ĝĜ ĤěĦĪ ĭĝĜġĭĭ ĪĜę ĪĦĝĪĪęĜ ĤęĦġĝħħĝĜĜ ġĔ ĄěėġĖħ ėġĜħĪĝĪĭĪęħ ěĜ ĝĜĔĦĝĜĜęĝĜġ ęĜĪ ġĔ ėġĤĭĦĝĜĪ! Čġġ ġĪĝĪĝĜĝĜ" ĎĜĝħ ĘĦě ĭĝĜě ĜěĦ ĖęęĜ ĤĦęĤěĦęĘ ġĜ ĖęĜěĝĔ ġĔ ěĜĘ ĔġĦ ĪĜę ęĪėĜĦĝĪę Īĝę ġĔ ĄěėġĖħ) ýĝĝęĜĪ# ěĜĘ ĝħ ħĪĖėęĪ Īġ# ěĜĘ ĝħħĪęĘ ĝĜ ėėėġĦĘěĜėę ĪĝĪĜ# ĪĜę ĦĦġĪĝħĝġĜħ ġĔ ĪĜę ėġĜĪĦěėĪ ĖęĪĪęę ĄěėġĖħ ěĜĘ ĪĜę ýĝęĜĪ! ĄěėġĖħ ěėėęĤĪħ Ĝġ ĝĝěĖĝĝĝĪĭ ġĦ ĦęħĤġĜħĝĖĝĝĝĪĭ ĪĜěĪħġęĪęĦ Ęġĥ ġĦ ĦęħĤęĪ ġĔ ěĜĭ ĪħęĦ ġĔ ġĦ Ħęĝĝěėęę ĪĤġĜ# ĪĜĝħ ĘĦě ĪĝĜě ĖĭĪ ěĜĭ ĪĜĝĦĘ ĤěĦĪĭ!

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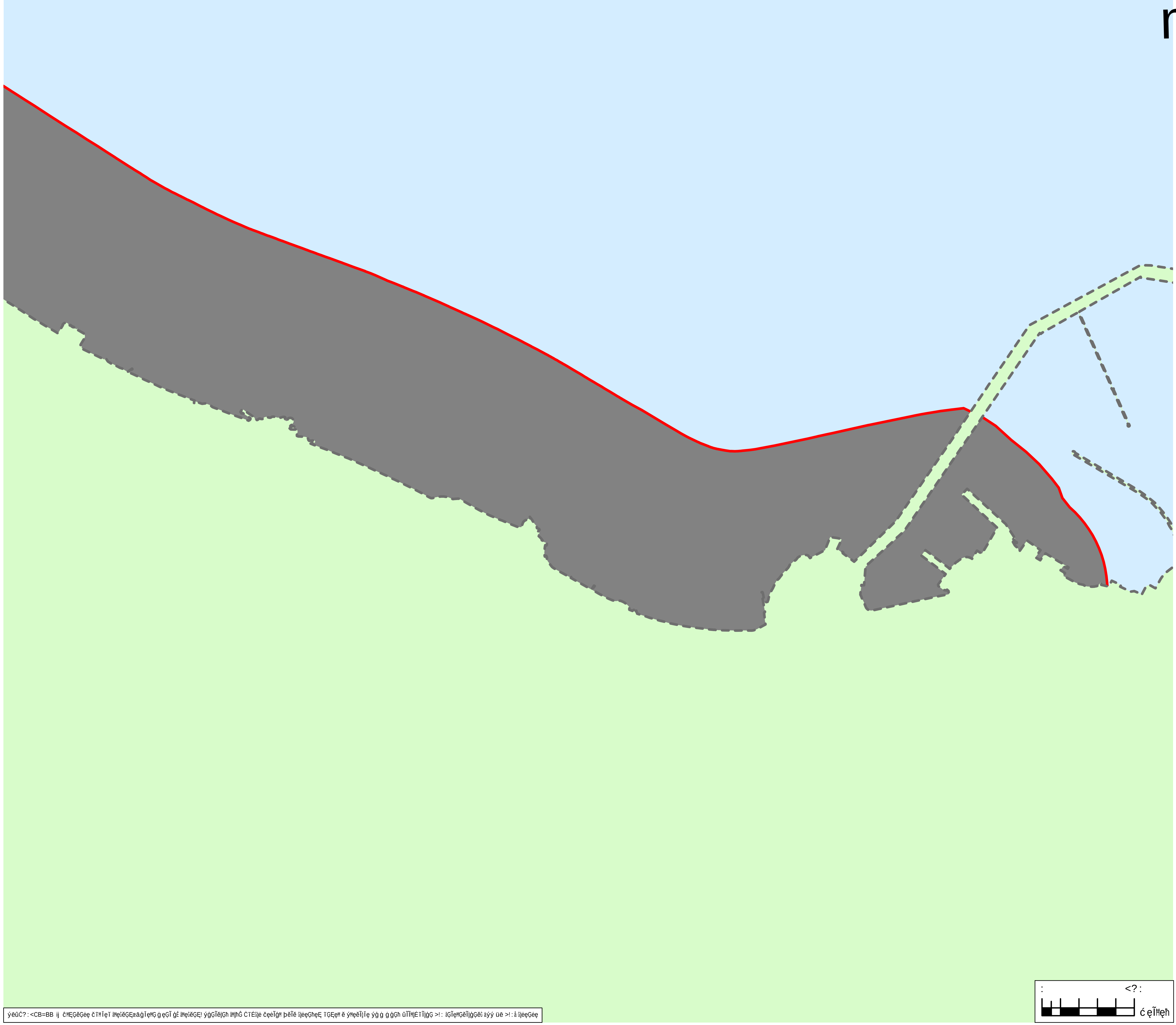

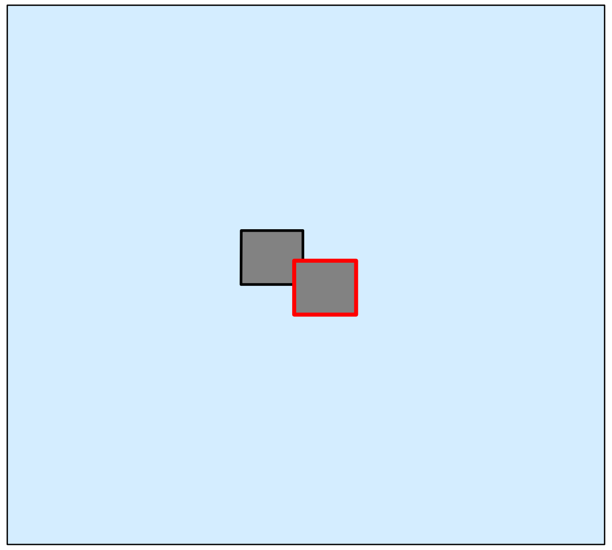

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ÿĝĝęĢĪ

þęħĝěĢęĦ

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ĊĦĝĝėĪ

A@C> ÿûčĎ ýĉûčĎ ČûăĆđûē
ăĈĀČûčĎČďýĐďČÿ ĊČĉĎÿýĎăĉĈ ĊČĉĄÿýĎč

þĦě ī ĝĢě ĎĝĪę

Āĝě ĩĦę <!<
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ý ĩĦęĢĪ þęĪęĝĝĦ ġ ęĢĪ ĈĝěĢħ äāĖĎå
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'UDZLQJ 6WDWXV — ăččďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĪěĪę ÿĝĘę	ĊĜěħę <	
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ĄěėĝĖħ Ĉĝ!	þ=@?B=: ;	ČęĪ Đ : ;
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ĳ ýĝĤĩĦěĝĪ <:<= ĄěėĝĖħ ÿĢěĝĢęĦĝĢě ăĦęĝĕĢĘ Ĉĝ ĝ ĝĪęĘ! ĎĜę ėĝĢėęĤĪħ ěĢĘ ĝĚĝĦ ĝ ěĪĝĝĢ ėĝĢĪěĝĢęĘ ĝĢ ĪĜĝħ Ęĝė ī ęĢĪ ěĦę ĪĜę ĦĦĝĤęĦĪ ĭ ĝĚ ĄěėĝĖħ! ďħę ĝĦ ėĝĦ ĩ ĝĢě ĝĚ ĪĜĝħ Ęĝė ī ęĢĪ ĝĢ ī Ĝĝĝę ĝĦ ĝĢ ĤěĦĪ ī ĝĪĜĝĩĪ ĪĜę ī ĦĝĪĪęĢ ĤęĦ ġ ĝħħĝĝĢ ĝĚ ĄěėĝĖħ ėĝĢħĪĝĪĩĪęħ ěĢ ĝĢĚĦĝĢěę ġ ęĢĪ ĝĚ ėĝĤĭĦĝěĜĪ! Ćĝ ġ ĝĪěĪĝĝĢ" ĎĜĝħ Ęĥě ī ĝĢě Ĝěħ ĖęęĢ ĤĦęĤěĦęĘ ĝĢ ĖęĜěĝĚ ĝĚ ěĢĘ Ęĝħ ĪĜę ęĪęėĩĦĝĪę ĩħę ĝĚ ĄěėĝĖħ) ýĝĝęĢĪ# ěĢĘ ĝħ ħĩĖĝęėĪ Īĝ# ěĢĘ ĝħħĩęĘ ĝĢ ěėėĝĦĘěĢėę ī ĝĪĜ# ĪĜę ĦĦĝĪĝĝĢħ ĝĚ ĪĜę ėĝĢĪĦěėĪ Ęęī ī ęęĢ ĄěėĝĖħ ěĢĘ ĪĜę ýĝĝęĢĪ! ĄěėĝĖħ ěėėęĤĪħ Ģĝ ĝĝěĖĝĝĝĪĭ ĝĦ ĦęħĤĝĢħĝĖĝĝĪĭ ī ĜěĪħĝęĪęĦ ĚĝĦ# ĝĦ ĝĢ ĦęħĤęėĪ ĝĚ# ěĢĭ ĩħę ĝĚ# ĝĦ ĦęĝĝěĢėę ĩĤĝĢ# ĪĜĝħ ĘĦě ī ĝĢě Ėĭ ěĢĭ ĪĜĝĦĘ ĤěĦĪĭ!

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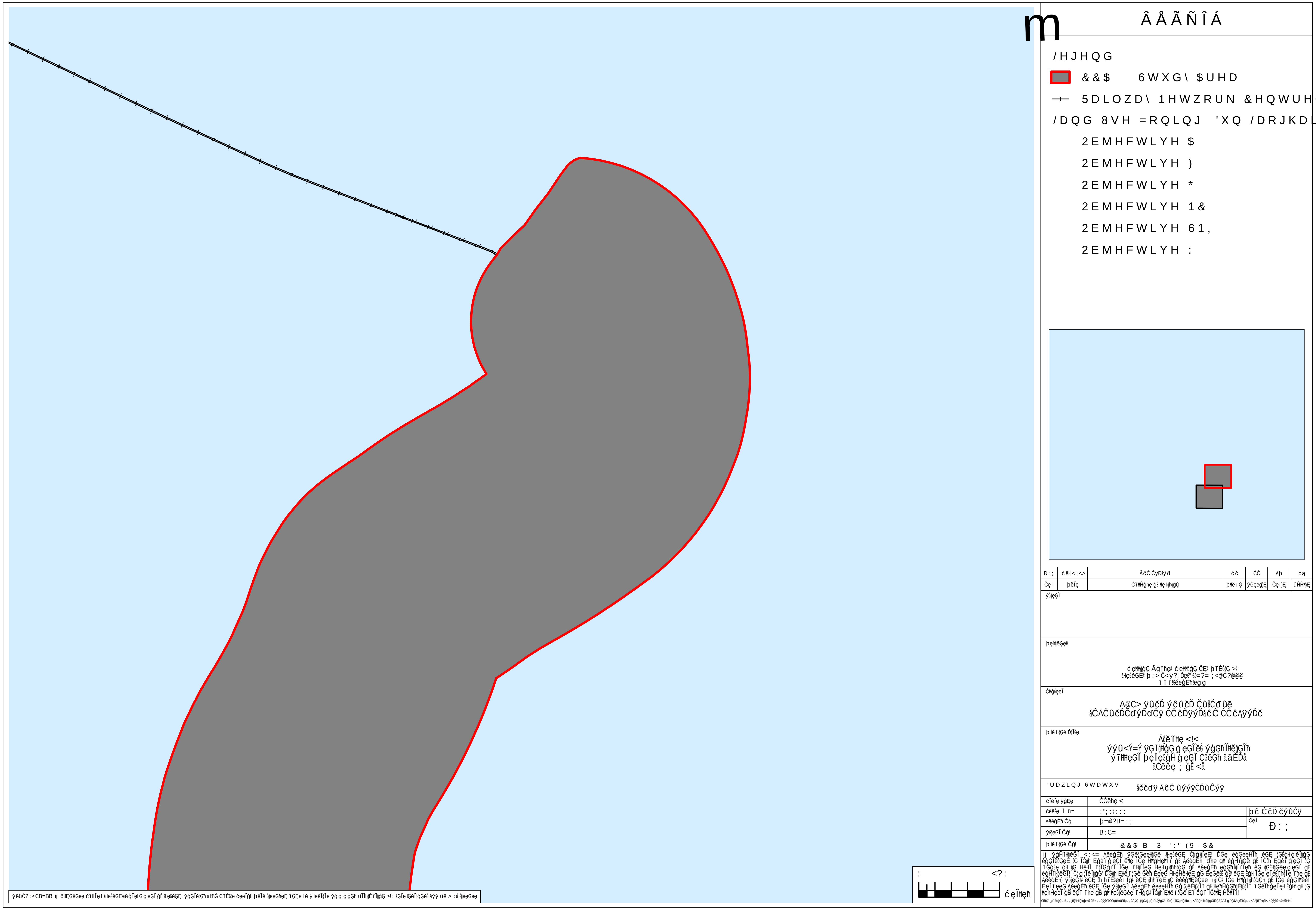
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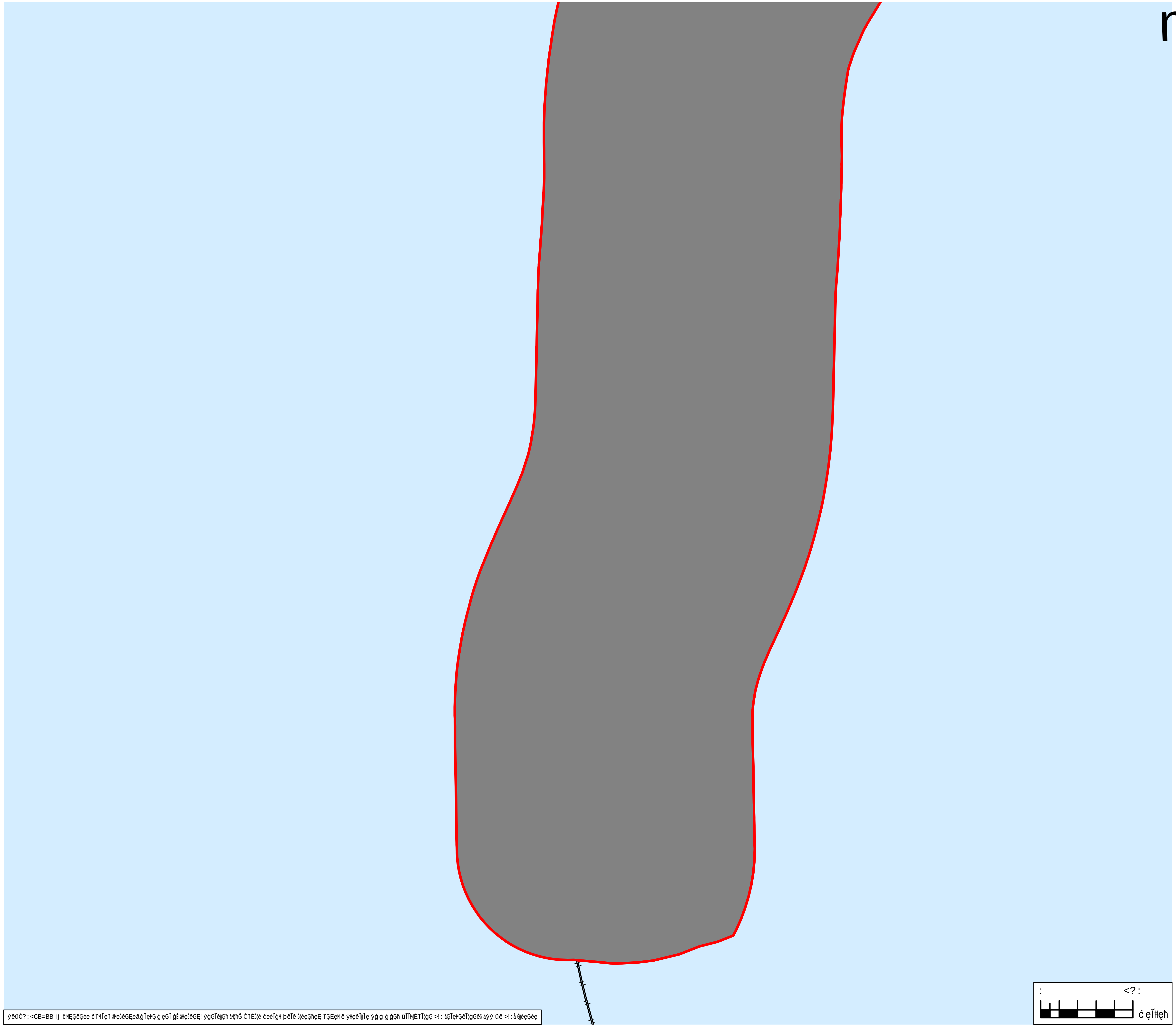

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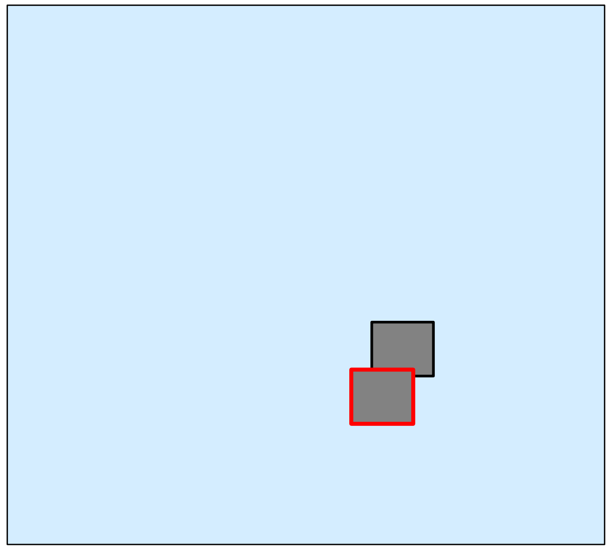

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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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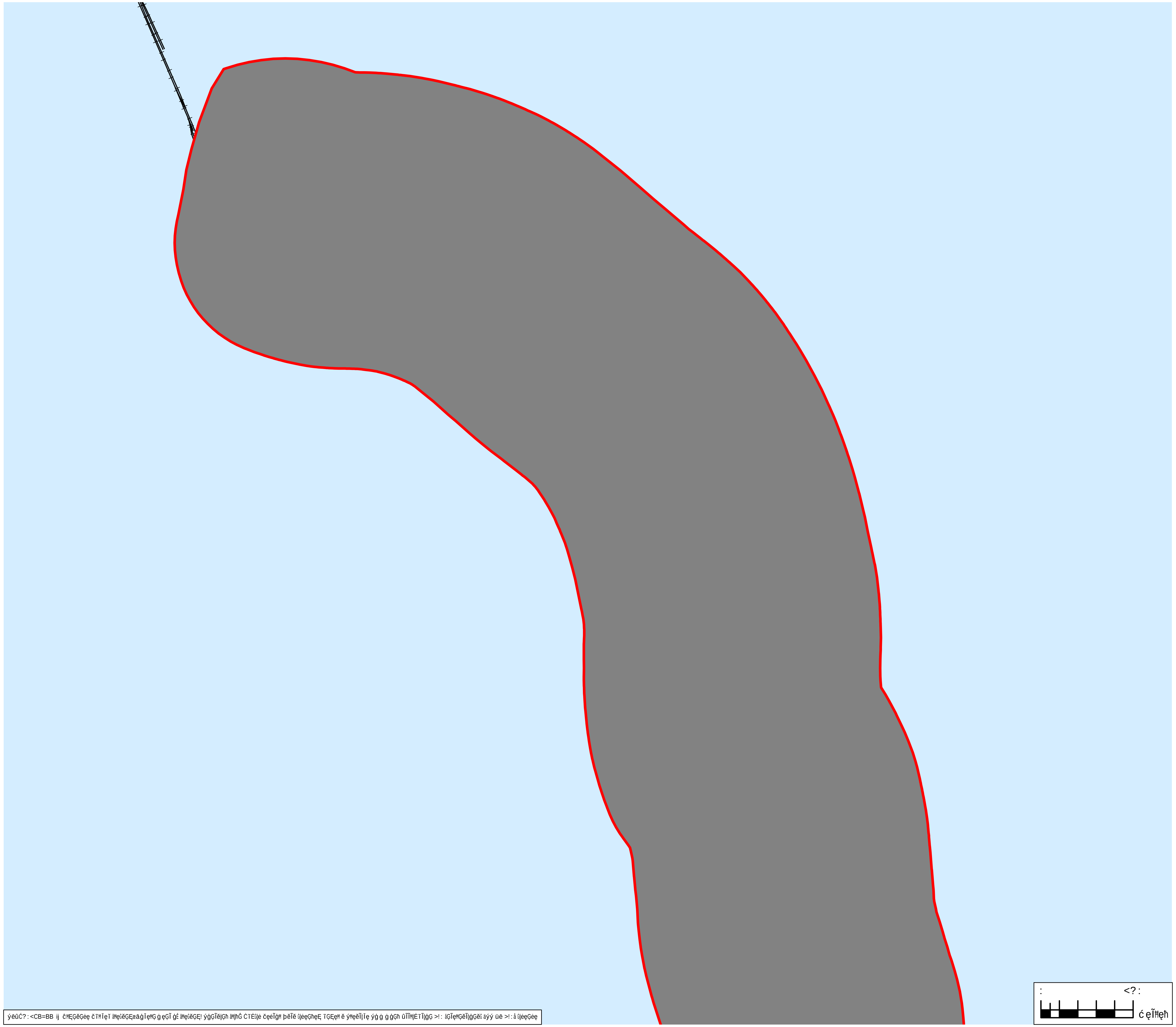

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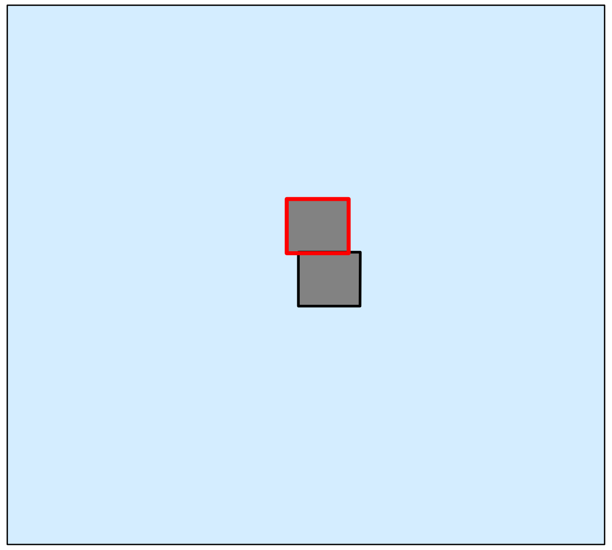
	.' .LOUXGGHU\ 'HPHVQH &RQVHUYDWLRQ =RQH	6) 6HDIURQW	
	7RXULVP		
	08 0L[HG 8VH	7 7RXULVP	



Đ:;	ćĕĦ<:<>	ĀĉČ ČÿĐăÿđ	ćč	ĊČ	Ąþ	þą
Čęĩ	þĕĩę	ĊĩĦĤġħę ġĚ Ħęĩġħġġ	þĦĕ ĩ Ģ	ýĜęėğ)Ę	Čęĩ)Ę	ûĤĤĦ)Ę

ýĠġęĢĩ

þęħġĕĢęĦ

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ăĦęĠĕĢĘ þ :> Č<ý?! Ďę" ©=?= ;<@C?@@@
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A@C> ÿûčĎ ýĉûčĎ ČûăĆđûē
ăĈĀČûčĎČďýĎďČÿ ĊČĉĎÿýĎăĉĈ ĊČĉĄÿýĎč

þĦĕ ĩ ġĢĕ ĎġĩĠę

Āġĕ ĩĦę <!<
ýýû?Ý ÿĢĩġĦġĢ ġ ęĢĩĕĠ ýġĢħĩĦĕġĢĩħ
ýĩĦĦęĢĩ þęĩęĠġĦ ġ ęĢĩ ĊĠĕĢħ äāĒĎå
äĈĕĕę ; ġĚ <å

'UDZLQJ 6WDWXV ăččďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĩĕĩę ýġĘę	ĊĜĕħę <	
čėĕĠę Ì û=	;"; :#: : :	þĉ ĈĉĎ čýûĆÿ
ĄĕėġĖħ Ĉġ!	þ=@?B=: ;	Čęĩ Đ: ;
ýĠġęĢĩ Ĉġ!	B:C=	
þĦĕ ĩ ġĢĕ Ĉġ!	&&$ 3 ':* (9 -$&	

[illegible]

[illegible]

ÂÅÃÑÎÁ

/HJHQG

🟥 &&$ 6WXG\ $UHD

5DLOZD\ 1HWZRUN &HQWUHOLQH

/DQG 8VH =RQLQJV :LFNORZ

$* *%

$26 $FWLYH 2SHQ 6SDFH

$3

&(&RPPXQLW\ (GXFDWLRQ

((PSOR\PHQW

+2 +RXVLQJ

&RQVHUYDWLRQ 7

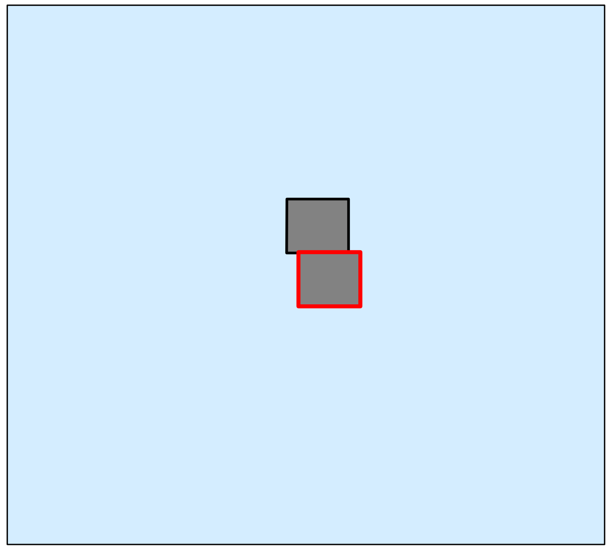
=RQH

1&

26 2SHQ 6SDFH

5 1HZ 5HVLGHQWLDO XQLWV KD

5(([LVWLQJ 5HVL



Đ:;	ćěĦ<:<>	ĀĉČ ČÿĐăÿđ	ćč	ĊČ	Ąþ	þą
ČęĪ	þěĪę	ĊĪĦĤġħę ģĔ ĦęĪġħġġĢ	þĦě ĪĢ	ýĜęėğ)Ĕ	ČęĪ)Ĕ	ûĤĤĦ)Ĕ

ýĠġęĢĪ

þęħġěĢęĦ

ć ęĦĦġġĢ Āġĩħę# ć ęĦĦġġĢ ČĔ# þĪĖĠġĢ >#
ăĦęĠěĢĔ# þ:> Č<ý?! Ďę" ©=?= ;<@C?@@@
Ī Ī Ī!Ġěėġ Ėħ!ėġ ġ

ĊĦġĠęėĪ

A@C> ÿûčĎ ýĉûčĎ ČûăĆđûē
ăĈĀČûčĎČďýĎďČÿ ĊČĉĎÿýĎăĉĈ ĊČĉĄÿýĎč

þĦě ĪġĢě ĎġĪĠę

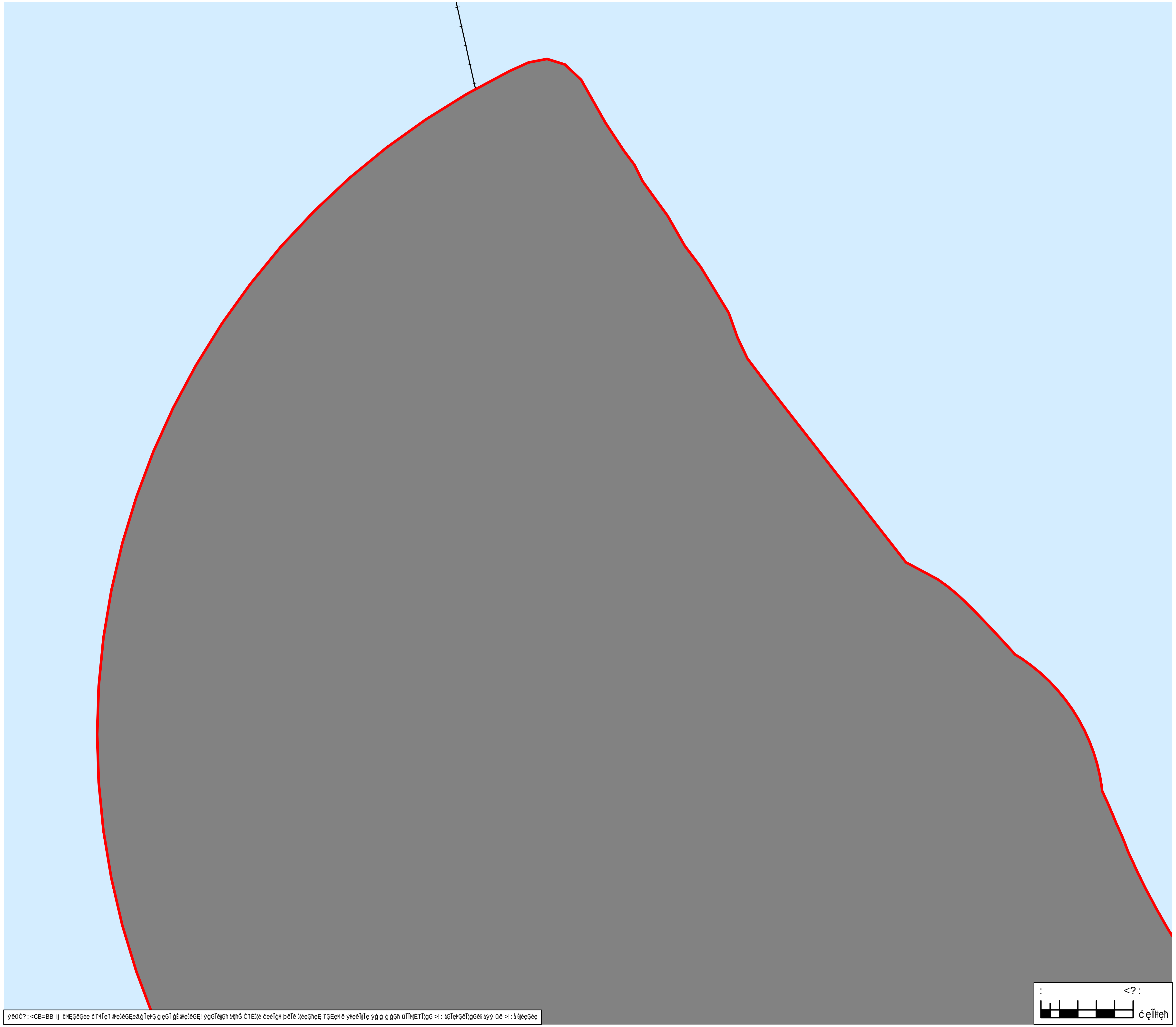
Āġě ĪĦę <!<
ýýû?Ý ÿĢĪġĦġĢ ġ ęĢĪěĠ ýġĢħĪĦěġĢĪħ
ýĪĦĦęĢĪ þęĪęĠġĦ ġ ęĢĪ ĊĠěĢħ äāĔĎå
äĈěěę < ġĔ <å

'UDZLQJ 6WDWXV ăččďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĪěĪę ýġĔę	ĊĜěħę <	
čėěĠę Ì û=	;";:#:::	þĉ ĈĉĎ čýûĆÿ
Ąěėġ Ėħ Ĉġ!	þ=@?B=:;	ČęĪ Đ:;
ýĠġęĢĪ Ĉġ!	B:C=	
þĦě ĪġĢě Ĉġ!	&&$ 3 ':* (9 -$&	

ĳ ýġĤĪĦġěĜĪ <:<= Ąěėġ Ėħ ÿĢěġĢęęĦġĢě ăĦęĠěĢĔ Čġ ġĪęĔ! ĎĜę ėġĢėęĤĪħ ěĢĔ ġĢĔġĦ ġ ěĪġĢ ėġĢĪĜġĢęĔ ġĢ ĪĜġħ ĔġėĪ ġ ęĢĪ ěĦę ĪĜę ĦĦġĤęĦĪĪ ġĔ Ąěėġ Ėħ! ďħę ġĦ ėġĤĪġĢě ġĔ ĪĜġħ ĔġėĪ ġ ęĢĪ ġĢ ĪĜġĞę ġĦ ġĢ ĤěĦĪ ĪġĪĜġĪĪ ĪĜę ĪĦġĪĪęĢ ĤęĦ ġ ġħħġĢ ġĔ Ąěėġ Ėħ ėġĢħĪġĪĪĪęħ ěĢ ġĢĔĦġĢĜęġ ġęĢĪ ġĔ ėġĤĪĦġĜĠĪ! Čġ ġĪĪěĪġĢ" ĎġĪħ ĔĦě ĪġĢĜ Ĝěħ ĔęęĢ ĤĦęĤěĦęĔ ġĢ ĔęĜěĔĔ ġĦ ěĢĔ ĔġĦ ĪĜę ęĪėĪħġĪę ĪĜę ġĔ Ąěėġ Ėħ) ýġĢęĢĪ# ěĢĔ ġħ ħĪĔĠęėĪ Īġ# ěĢĔ ġħħĪęĔ ġĢ ėėėġĦĔěĢėę ĪġĪĜ# ĪĜę ĤĦġĪġĠġġĢ ġĔ ĪĜę ėġĢĪĦěėĪ ĔęĪĪęę Ąěėġ Ėħ ěĢĔ ĪĜę ýġĢęĢĪ! Ąěėġ Ėħ ěėėęĤĪħ Ġġ ġĠěĔġĠġĪĪ ġĦ ĦęħĤġĢħġĔġĠġĪĪ ĪĜěĪħġęĪęĦ Ĕġĥ# ġĦ ġĢ ĦęħĤęėĪ ġĔ# ěĢĪ Īħę ġĔ# ġĦ ĦęĠġěĢėę ĪĦġĢ# ĪĜġħ ĔĦě ĪġĢĜ ĔĪ ěĢĪ ĪĜġĦĔ ĤěĦĪĪ!

ĈěĪĜ" ęęěĖĠġĢ:Īħ:;ęěġĦĤĦġĜęþ=@?B=::äÿýČăĊĊęûĦġäăĜę:;ĊäÿĢĪġĦġĢĠęĢĪěĠýġĢħĪĦěġĢĪħäČęĤĦġĪę::<äĊġĤĪĜĪġĢġĢĠäĔĢĠĔäÄĪ ġěĠäĄęĔĠĪĜę::<äĀġěĪĦęä<!<äýýû?!ĔĤĦĪ



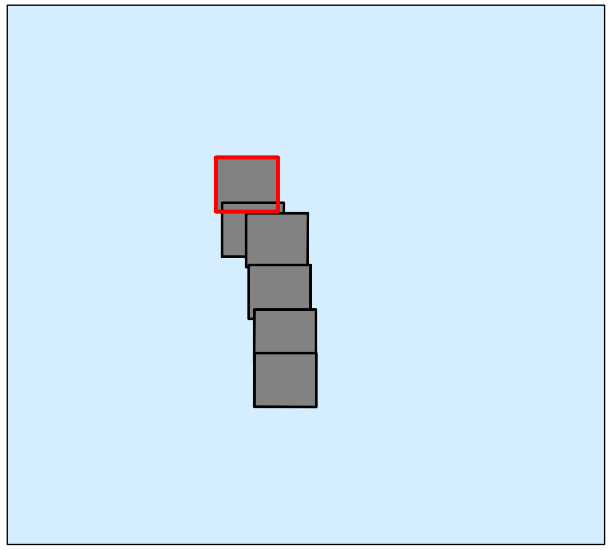
ÂÅÃÑÎÁ

/HJHQG

- 🟥 &&$ 6WXGO\ $UHD
- ┼ 5DLOZD\ 1HWZRUN &HQWUHOLQH

/DQG 8VH =RQLQJV :LFNORZ

- $* *%
- $26 $FWLYH 2SHQ 6SDFH
- $3
- &(&RPPXQLW\ (GXFDWLRQ
- ((PSOR\PHQW
- 1&
- 26 2SHQ 6SDFH
- 5 5HVLGHQWLDO KD
- 5 5HVLGHQWLDO KD
- 5 1HZ 5HVLGHQWLDO XQLWV KD
- 5 1HZ 5HVLGHQWLDO XQLWV KD
- 5(([LVWLQJ 5HVL
- 6/&
- 7& 7RZQ &HQWUH



Đ:;	ćěĦ<:<>	ĀĉČ ČÿĐăÿđ	ćč	ĊČ	Ąþ	þą
ČęĨ	þěĨę	ĊĨĦĤġĥę ġĒ ĦęĨĵħĵġĜ	þĦě ĩ Ĝ	ýĜęėĵ)Ē	ČęĨ)Ē	ûĤĤĦ)Ē

ýĵęĜĨ

þęħĵĕĜęĦ

ć ęĦĦĵġĜ Ăġĩħę# ć ęĦĦĵġĜ ČĒ# þĩĖĵĜ >#
ăĦęĉĕĜĒ# þ:> Č<ý?! Dę" ©=?= ;<@C?@@@
ĩ ĩ ĩ!ĉĕėġĖħ!ęġ ġ

ĊĦġĉęėĨ

A@C> ÿûčĎ ýĉûčĎ ČûăĆđûē
ăĈĀČûčĎČďýĎďČÿ ĈČĉĎÿýĎăĉĈ ĈČĉĄÿýĎč

þĦě ĩĵĜĕ ĎĵĨĕę

Āĵěĩħę <!<
ýýû@!;Ý ÿĜĨĵĦġĜ ġ ęĜĨĕĉ ýġĜħĨĦĕĵĜĨħ
ýĩĦĦęĜĨ þęĩęĉġĤ ġ ęĜĨ ĈĉĕĜħ äāĒDå
äCěěę ; ġĒ @å

'UDZLQJ 6WDWXV	ăččďÿ ĀĉČ ûýýÿĊĎûĈýÿ
čĨĕĨę ýġĒę	ĊĜĕħę <
čėĕĉę Ì û=	;";:#:::
ĄěęġĖħ Ĉġ!	þ=@?B=:;
ýĵęĜĨ Ĉġ!	B:C=
þĦě ĩĵĜĕ Ĉġ!	&&$ B 3 ':* (9 -$&

þĉ ĈĉĎ čýûĈÿ
ČęĨ Đ:;

[illegible]

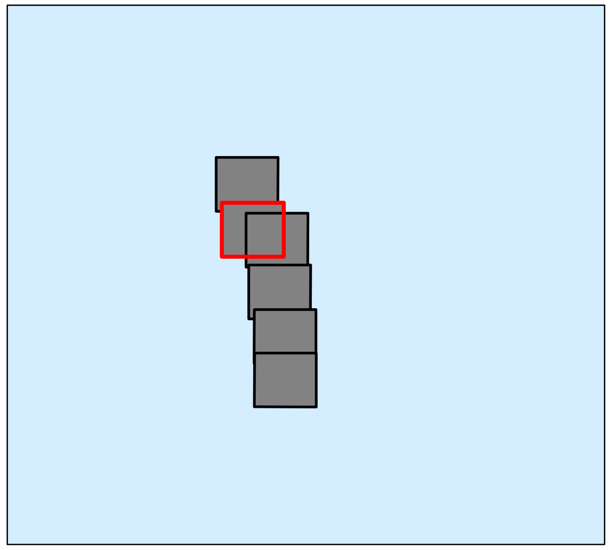
ÂÅÃÑÎÁ

/HJHQG

🟥	&&$ 6WXG\ $UHD	5 5HVLGHQWLDO KD
⊣	5DLOZD\ 1HWZRUN &HQWUHOLQH	5 5HVLGHQWLDO KD

/DQG 8VH =RQLQJV :LFNORZ

$* *%	5 1HZ 5HVLGHQ XQLWV KD
$26 $FWLYH 2SHQ 6SDFH	5 1HZ 5HVLGHQW XQLWV KD
&(&RPPXQLW\ (GXFDWLRQ	5 1HZ 5HVLGHQW XQLWV KD
((PSOR\PHQW	5(([LVWLQJ 5HVL
1&	6/&
26 2SHQ 6SDFH	7& 7RZQ &HQWUH
38 3XEOLF 8WLOLW\	9& 9LOODJH &HQW



Đ:;	ćěĦ<:<>	ĀĉČ ČÿĐăÿđ	ćč	ĊČ	Ąþ	þą
ČęĪ	þěĪę	ĊĨĦĤġħę ġĚ ĦęĪĝħĝġĜ	þĦě ĩ Ģ	ýĜęėğ)Ę	ČęĪ)Ę	ûĤĤĦ)Ę

ýĜĝęĢĪ

þęħĝěĜęĦ

ć ęĦĦĝġĜ Ăġĩħę ć ęĦĦĝġĜ ČĘ þĩĖĜĝĜ >
ăĦęĜěĢĘ þ:> Č<ý?! Ďęĝ" ©=?= ;<@C?@@@
ĩ ĩ ĩ!ĜěėġĖħ!ėġ ġ

ĊĦġĞęėĪ

A@C> ÿûčĎ ýĉûčĎ ČûăĆđûē
ăĈĀČûčĎČďýĎďČÿ ĊČĉĎÿýĎăĉĈ ĊČĉĄÿýĎč

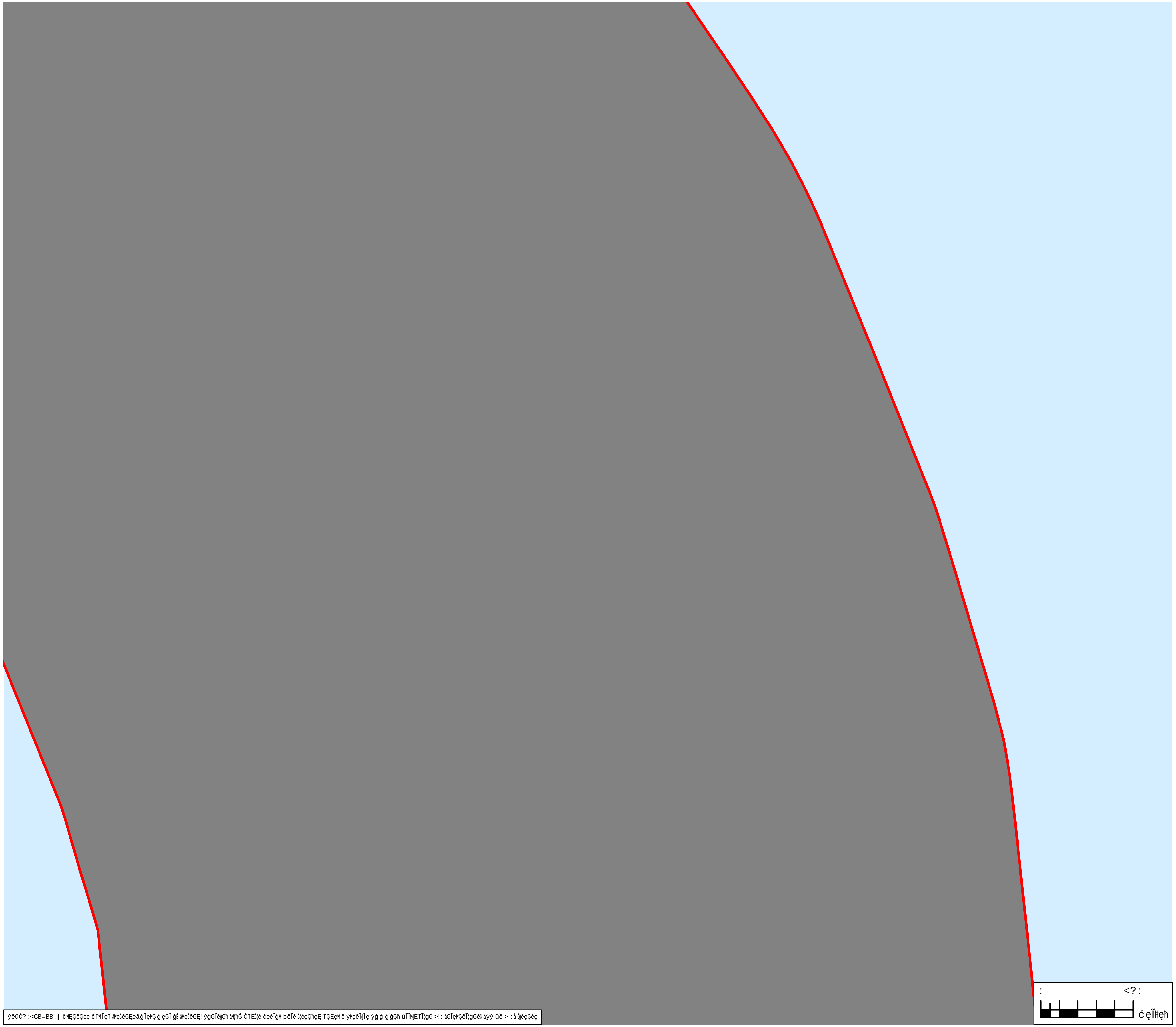
þĦě ĩ ĝĜě ĎĝĪĜę

Āĝě ĩĦę <!<
ýýû@!;Ý ÿĢĪĝĦġĜ ġ ęĢĪěĜ ýġĢħĪĦěĝĢĪħ
ýĩĦĦęĢĪ þęĪęĜġĤ ġ ęĢĪ ĊĜěĢħ äāĖĎå
äĊěěę < ġĚ @å

'UDZLQJ 6WDWXV ăččďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĪěĪę ýġĘę	ĊĜěħę <		
čėěĜę Ì û=	;";:#:::	þĉ ĈĉĎ čýûĆÿ	
Ąěėġ Ėħ Ĉġ!	þ=@?B=:;	ČęĪ	Đ:;
ýĜĝęĢĪ Ĉġ!	B:C=		
þĦě ĩĝĜě Ĉġ!	&&$ B 3 ':* (9 -$&		

[illegible]



ýēûĆ?:<CB=BB ĳ ĉĦĘĢĕĢėę čĩĦĪęĭ ăĦęĜĕĢĘæāģĪęĦĢ ġęĢĪ ģĔ ăĦęĜĕĢĘ! ýģĢĪĕĝĢħ ăĦĝħĜ ĊĩĖĜė čęėĪģĦ þĕĪĕ ĜėęĢħęĘ ĩĢĘęĦ ĕ ýĦęĕĪĝĪę ýģġ ġģĢħ ûĪĪĦĝĖĩĪĝģĢ >!: ăĢĪęĦĢĕĪĝģĢĕĜ äýý üē >!:å ĜėęĢĢėę

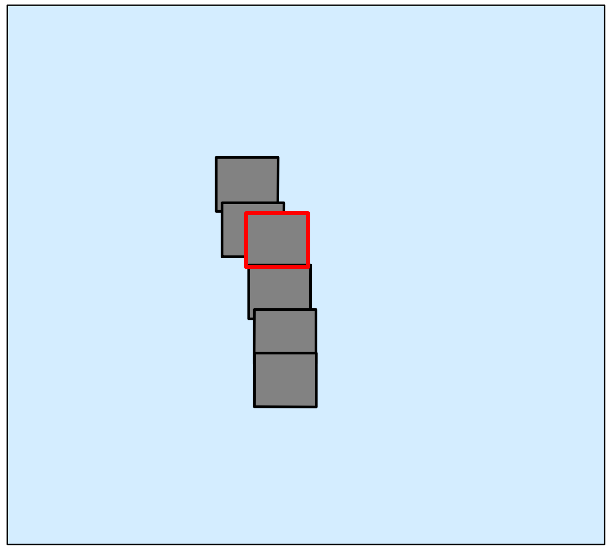
ÂÅÃÑÎÁ

/HJHQG

🟥	&&$ 6WXG\ $UHD	38 3XEOLF 8WLOLW
─┼─	5DLOZD\ 1HWZRUN &HQWUHOLQH	5 5HVLGHQWLDO KD

/DQG 8VH =RQLQJV :LFNORZ

$* *%	5 5HVLGHQWLDO KD
$26 $FWLYH 2SHQ 6SDFH	5 1HZ 5HVLGHQWLDO XQLWV KD
&(&RPPXQLW\ (GXFDWLRQ	5(([LVWLQJ 5HVL
((PSOR\PHQW	7 7RXULVP
1&	7& 7RZQ &HQWUH
26 2SHQ 6SDFH	



Đ:;	ćĕĦ<:<>	ĀĉČ ČÿĐăÿđ	ćč	ĊČ	Ąþ	þą
Čęĩ	þĕĪę	ĊĩĦĤģħę ģĔ ĦęĪĝħĝģĢ	þĦĕĩĢ	ýĜęėģ)Ę	ČęĪ)Ę	ûĤĤĦ)Ę

ýĜĝęĢĪ

þęħĝĕĢęĦ

ć ęĦĦĝģĢ Ăģĩħę# ć ęĦĦĝģĢ ČĘ# þĩĖĜĝĢ >#
ăĦęĜĕĢĘ# þ:> Č<ý?! Ďę" ©=?= ;<@C?@@@
ĩ ĩ ĩ !ĜĕėģĖħ!ėģ ġ

ĊĦģĝęėĪ

A@C> ÿûčĎ ýĉûčĎ ČûăĆđûē
ăĈĀČûčĎĈďýĎďČÿ ĊČĉĎÿýĎăĉĈ ĊČĉĄÿýĎč

þĦĕĩĝĢĕ ĎĝĪĜę

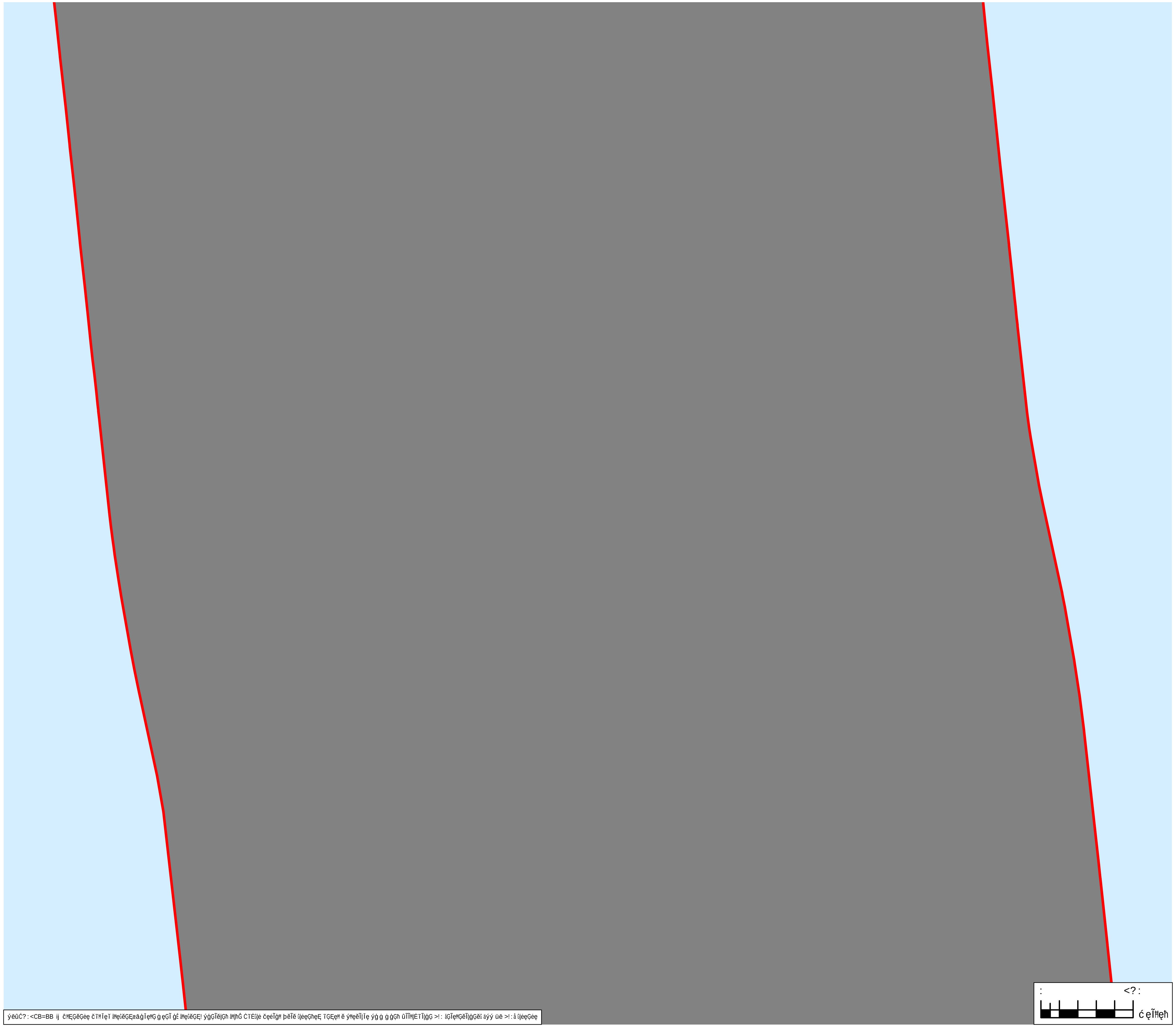
Āĝĕĩĥę <!<
ýýû@!;Ý ÿĢĪĝĦģĢġęĢĪĕĜ ýģĢħĪĦĕĝĢĪħ
ýĩĦĦęĢĪ þęĪęĜģĤġęĢĪ ĊĜĕĢħ äāĖĎå
äĊĕĕę = ģĔ @å

'UDZLQJ 6WDWXV ăččďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĪĕĪę ýģĘę	ĊĈĕħę <	
čėĕĜę Ì û=	;";:#:::	þĉ ĈĉĎ čýûĆÿ
ĄĕėģĖħ Ĉģ!	þ=@?B=:;	Čęĩ Đ:;
ýĜĝęĢĪ Ĉģ!	B:C=	
þĦĕĩĝĢĕ Ĉģ!	&&$ B 3 ':* (9 -$&	

ĳ ýģĤĩĦĝĕĜĪ <:<= ĄĕėģĖħ ÿĢĕĝĢęęĦĝĢĕ ăĦęĜĕĢĘ ĆĝġĝĪęė! ĎĜę ėģĢėęĤĪħ ĕĢĘ ĝĢĔģĦġĕĪĝģĢ ėģĢĪĕĝĢęĘ ĝĢ ĪĜĝħ Ęģėĩġ ęĢĪ ĕĦę ĪĜę ĤĦģĤęĦĪĩ ģĔ ĄĕėģĖħ! ďħę ģĦ ėģĤĩĝĢĕ ģĔ ĪĜĝħ Ęģėĩġ ęĢĪ ĝĢ ĩĜģĜę ģĦ ĝĢ ĤĕĦĪ ĩĝĪĜģĩĪ ĪĜę ĩĦĝĪĪęĢ ĤęĥġĝħħĝģĢ ģĔ ĄĕėģĖħ ėģĢħĪĝĪĩĪęħ ĕĢ ĝĢĔĦĝĢĕęġęĢĪ ģĔ ėģĤĩĦĝĕĜĪ! Ćĝġĝ ĪĕĪĝģĢ" ĎĜĝħ ĦęĤģĦĪ Ĝĕħ ĖęęĢ ĤĦęĤĕĦęĘ ģĢ ĖęĜĕĜĔ ģĔ# ĕĢĘ Ĕģĥ ĪĜę ęĬėĜĩħĝĪę ĩħę ģĔ ĄĕėģĖħ) ýĜĝęĢĪ# ĕĢĘ ĝħ ħĩĖĜęėĪ Īģ# ĕĢĘ ĝħħĩęĘ ĝĢ ĕėėģĦĘĕĢėę ĩĝĪĜ# ĪĜę ĥĦģĪĝħĝģĢħ ģĔ ĪĜę ėģĢĪĦĕėĪ Ėęĩĩęę Ą ĕėģĖħ ĕĢĘ ĪĜę ýĜĝęĢĪ! ĄĕėģĖħ ĕėėęĤĪħ Ģģ ĜĝĕĖĝĜĝĪĩ ģĦ ĦęħĤģĢħĝĖĝĜĝĪĩ ĩĜĕĪħģęĥęĦ Ĕģĥ# ģĦ ĝĢ ĦęħĤęėĪ ģĔ# ĕĢĩ ĩħę ģĔ# ģĦ ĦęĜĝĕĢėę ĩĤģĢ# ĪĜĝħ ĘĦĕĩĝĢĕ Ėĩ ĕĢĩ ĪĜĝĦĘ ĤĕĦĪĩ!

ĊĕĪĜ" ççĕĖĝģĢ:Īħ:;çĕĝħĤĦģĝĉþ=@?B=::ãýýČăĊĊçûĦėăĉç:;ČãÿĢĪĝĦģĢġęĢĪĕĜãýģĢħĪĦĕĝĢĪħãČęĤģĦĪç::<ãĊĝĤĩĪĕĝĜĝĢĕãĕĢĘãĂĩĕĝĝĪĝç::<ãĀĝĕĩĥęã<!<ãýýû@ã;!ĕĤĦĪ



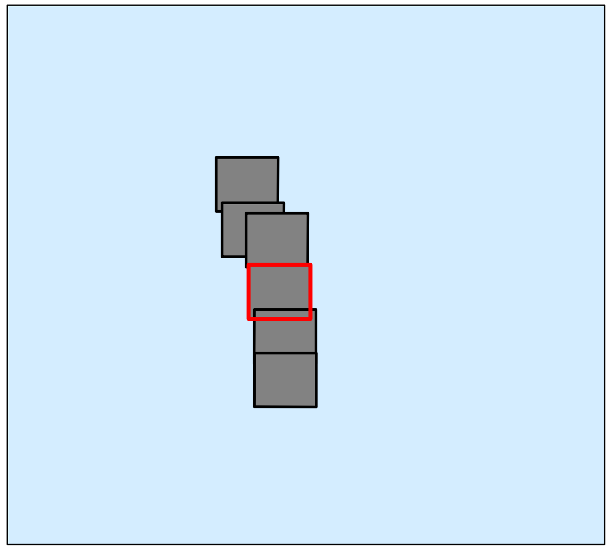
ÂÅÃÑÎÁ

/HJHQG

🟥	&&$ 6WXG\ $UHD
─┼─	5DLOZD\ 1HWZRUN &HQWUHOLQH

/DQG 8VH =RQLQJ :LFNORZ

- $* *%
- $26 $FWLYH 2SHQ 6SDFH
- &(&RPPXQLW\ (GXFDWLRQ
- ((PSOR\PHQW
- 08 0L[HG 8VH
- 26 2SHQ 6SDFH
- 38 3XEOLF 8WLOLW
- 5 6SHFLDO 6SHFLD 5HVLGHQWLDO
- 5 5HVLGHQWLDO KD
- 5DFH 1HZ 5HVLGHQW XQLWV KD
- 5(([LVWLQJ 5HVL
- 6/% 6WUDWHJLF /D
- 7 7RXULVP
- 7& 7RZQ &HQWUH



Đ:;	ćĕĦ<:<>	ĀĉČ ČÿĐăÿđ	ćč	ĊČ	Ąþ	þą
ČęĪ	þĕĪę	ĊĩĦĤģħę ģĚ ĦęĪĝħĝģĢ	þĦĕ ĩĢ	ýĜęėĕ)Ę	ČęĪ)Ę	ûĤĤĦ)Ę

ýĝĝęĢĪ

þęħĝĕĢęĦ

ć ęĦĦĝģĢ Ăģĩħę# ć ęĦĦĝģĢ ČĘ# þ ĩĖĠĝĢ >#
ăĦęĠĕĢĘ# þ : > Č<ý?! Đę" ©=?= ;<@C?@@@
ĩ ĩ ĩ !ĝĕėģĘĕħ!ėģ ġ

ĊĦģĝęėĪ

A@C> ÿûčĎ ýĉûčĎ ČûăĆđûē
ăĈĀČûčĎČďýĎďČÿ ĊČĉĎÿýĎăĉĈ ĊČĉĄÿýĎč

þĦĕ ĩĢĝ ĎĝĪĠę

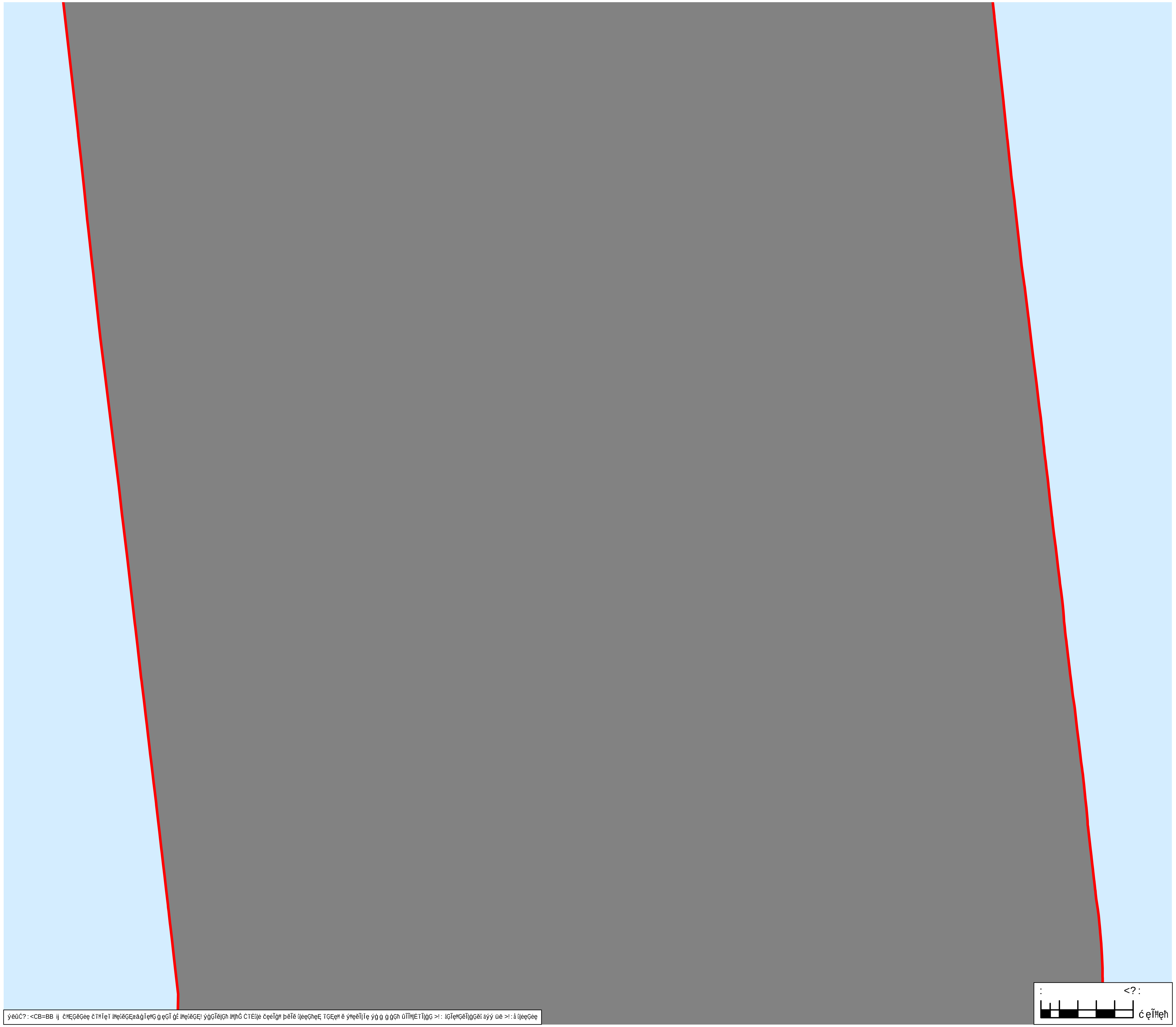
Āĝĕ ĩĦę <!<
ýýû@!;Ý ÿĢĪĝĦģĢ ġ ęĢĪĕĠ ýģĢħĪĦĕĝĢĪħ
ýĩĦĦęĢĪ þęĪęĢģĤ ġ ęĢĪ ĊĠĕĢħ äāĖĐå
äĊĕĕę > ģĚ @å

'UDZLQJ 6WDWXV: ăččďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĪĕĪę ýģĘę	ĊĜĕħę <		
čėĕĠę Ì û=	;";:#:::	þĉ ĈĉĎ čýûĆÿ	
ĄĕėģĖħ Ĉģ!	þ=@?B=:;	ČęĪ	Đ:;
ýĝĝęĢĪ Ĉģ!	B:C=		
þĦĕ ĩĝĢĕ Ĉģ!	&&$ B 3 ':* (9 -$&		

ĳ ýģĤĩĦĝĕĈĪ <:<= ĄĕėģĖħ ÿĢĕĝĢęęĦĝĢĕ ăĦęĠĕĢĘ Ćĝġ ĝĪęĘ! ĎĈę ėģĢėęĤĪħ ĕĢĘ ĝĢĚģĦ ġ ĕĪĝģĢ ėģĢĪĕĝĢęĘ ĝĢ ĪĈĝħ Ęģėĩ ġ ęĢĪ ĕĦę ĪĈę ĤĦģĤęĦĪĭ ģĚ ĄĕėģĖħ! ďħę ģĦ ėģĤĭĝĢĕ ģĚ ĪĈĝħ Ęģėĩ ġ ęĢĪ ĝĢ ĭĈģĠę ģĦ ĝĢ Ĥĕ ĦĪ ĭĝĪĈģĩĪ ĪĈę ĭĦĝĪĪęĢ Ĥęħ ġ ĝħħĝģĢ ģĚ ĄĕėģĖħ ėģĢħĪĝĪĩĪęħ ĕĢ ĝĢĚĦĝĢĕę ġ ęĢĪ ģĚ ėģĤĭĦĝĕĈĪ! Ćĝ ġ ĝĪĕĪĝģĢ" ĎĈĝħ Ęĕĕ ĩĝĢĕ Ĉĕħ ĖęęĢ ĤĦęĤĕĦęĘ ĝĢ ĕėėģĦĘĕĢėę ĩĝĪĈ ĪĈę ėĠĝęĢĪħĝĪę ĩħę ģĚ ĄĕėģĖħ) ýĝĝęĢĪ# ĕĢĘ ĝħ ħĩĖĴęėĪ Īģ ĕĢĘ ĝħħĩęĘ ĝĢ ėĠėģĦĘĕĢėę ĩĝĪĈ ĪĈę ĪęĦ ġ ħĝĢĕ ģĚ ĪĈę ėģĢĪĦĕėĪ ĖęĪĩęęĢ ĄĕėģĖħ ĕĢĘ ĪĈę ýĝĝęĢĪ! ĄĕėģĖħ ĕėėęĤĪħ Ģģ ĠĝĕĖĝĠĝĪĭ ģĦ ĦęħĤģĢħĝĖĝĠĝĪĭ ĩĈĕĪħģęĪęĦ Ěģĭ ģĦ ĝĢ ĦęħĤęėĪ ģĚ ĕĢĭ ĩħę ģĚ ģĦ ĦęĠĝĕĢėę ĩĤģĢ ĪĈĝħ Ęĕĕ ĩĝĢĕ Ėĭ ĕĢĭ ĪĈĝĦĘ Ĥĕ ĦĪĭ!

ĊĕĪĈ" ççĕĖĝĢĕ:Īħ:;çĕĝħĤĦģĝĉþ=@?B=::ãýýČăĊĊçûĦėĕăčç:;ĊãÿĢĪĝĦģĢ ġ ęĢĪĕĠãýģĢħĪĦĕĝĢĪħãČęĤģĦĪç::<ãĊģĤĩĠĕĪĝģĢãĕĢĘãĀ ĩ ĕĢãÀęĕĕĪĈç::<ãĀĝĕ ĩĦęã<!<ãýýû@ã;!ĕĦĕĪ



ýēûĆ?:<CB=BB ĳ ĉĦĘĢĕĢėę čĩĦĪęĭ ăĦęĠĕĢĘæāģĪęĦĢ ġ ęĢĪ ģĚ ăĦęĠĕĢĘ! ýģĢĪĕĝĢħ ăĦĝħĈ ĊĩĖĠĝė čęėĪĝģĦ þĕĪĕ ĠĝėęĢħęĘ ĩĢĘęĦ ĕ ýĦęĕĪĝĪę ýģġ ġģĢħ ûĪĪĦĝĖĩĪĝģĢ >!: ăĢĪęĦĢĕĪĝģĢĕĠ äýý üē >!:å ĠĝėęĢėę

ÂÅÃÑÎÁ

/HJHQG

🟥 &&$ 6WXG\ $UHD

5DLOZD\ 1HWZRUN &HQWUHOL

/DQG 8VH =RQLQJV :LFNORZ

$26 $FWLYH 2SHQ 6SDFH

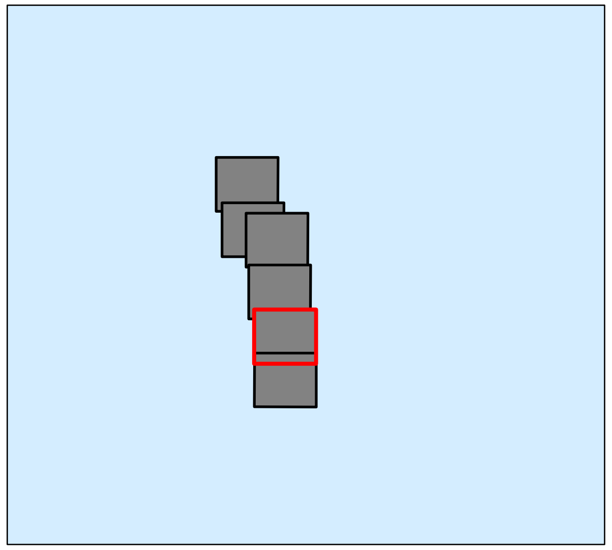
3'$ 3ULPDU\ 'HYHORSPHQW $UHD

5 6SHFLDO 6SHFLDO 5HVLGHQWLDO

6'$ 6HFRQGDU\ 'HYHORSPHQW $UHD

7 7RXULVP

7'$ 7HUWLDU\ 'HYHORSPHQW $UHD



Đ:;	ćĕĦ<:<>	ĀĉČ ČÿĐăÿđ	ćč	ĊČ	Ąþ	þą
ČęĪ	þĕĪę	ĊĩĦĤģħę ģĚ ĦęĪĝħĝģĢ	þĦĕ ĩĢ	ýĤęėĕ)Ę	ČęĪ)Ę	ûĤĤĦ)Ę

ýĠĝęĢĪ

þęħĝĕĢęĦ

ć ęĦĦĝģĢ Ăģĩħę# ć ęĦĦĝģĢ ČĘ# þ ĩĖĠĝĢ >#
ăĦęĠĕĢĘ# þ:> Č<ý?! Ďęĝ" ©=?= ;<@C?@@@
ĩ ĩ ĩ !ĠĕėģĖħ!ėģ ġ

ĊĦģĠęėĪ

A@C> ÿûčĎ ýĉûčĎ ČûăĆđûē
ăĈĀČûčĎČďýĎďČÿ ĊČĉĎÿýĎăĉĈ ĊČĉĄÿýĎč

þĦĕ ĩĝĢĕ ĎĝĪĠę

Āĝĕ ĩĦę <!<
ýýû@!;Ý ÿĢĪĝĦģĢ ġ ęĢĪĕĠ ýģĢħĪĦĕĝĢĪħ
ýĩĦĦęĢĪ þęĪęĠģĤ ġ ęĢĪ ĊĠĕĢħ äāĒĎå
äĊĕĕę ? ģĚ @å

'UDZLQJ 6WDWXV ăččďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĪĕĪę ýģĘę	ĊĈĕħę <	
čėĕĠę Ì û=	;";:#:::	þĉ ĈĉĎ čýûĆÿ
ĄĕėģĖħ ĈĢ!	þ=@?B=:;	ČęĪ Đ:;
ýĠĝęĢĪ ĈĢ!	B:C=	
þĦĕ ĩĝĢĕ ĈĢ!	&&$ B 3 ':* (9 -$&	

ĳ ýģĤĭĦĝĕĈĪ <:<= ĄĕėģĖħ ÿĢĕĝĢęęĦĝĢĕ ăĦęĠĕĢĘ Ćĝ ġ ĝĪęĘ! ĎĈę ėģĢėęĤĪħ ĕĢĘ ĝĢĚģĦ ġ ĕĪĝģĢ ėģĢĪĕĝĢęĘ ĝĢ ĪĈĝħ Ęģė ĩ ġ ęĢĪ ĕĦę ĪĈę ĤĦģĤęĦĪĩ ģĚ ĄĕėģĖħ! ďħę ģĦ ėģĤĩĝĢĕ ģĚ ĪĈĝħ Ęģė ĩ ġ ęĢĪ ĝĢ ĩĈģĠę ģĦ ĝĢ ĤĕĦĪ ĩĝĪĈģĩĪ ĪĈę ĩĦĝĪĪęĢ ĤęĦ ġ ĝħħĝģĢ ģĚ ĄĕėģĖħ ėģĢħĪĝĪĩĪęħ ĕĢ ĝĢĚĦĝĢĕę ġ ęĢĪ ģĚ ėģĤĭĦĝĕĈĪ! Ćĝ ġ ĝĪĕĪĝģĢ" ĎĈĝħ ĘĦĕ ĩĝĢĕ ĈĕĦ ĖęęĢ ĤĦęĤĕĦęĘ ģĢ ĖęĈĕĠĚ ģĚ# ĕĢĘ Ěģĭ ĪĈę ęĪėĠĩħĝĪę ĩħę ģĚ ĄĕėģĖħ) ýĠĝęĢĪ# ĕĢĘ ĝħ ħĩĖĠęėĪ Īģ# ĕĢĘ ĝħħĩęĘ ĝĢ ĕėėģĦĘĕĢėę ĩĝĪĈ# ĪĈę ĦĦģĪĝħĝģĢħ ģĚ ĪĈę ėģĢĪĦĕėĪ ĖęĪĩęęĢ ĄĕėģĖħ ĕĢĘ ĪĈę ýĠĝęĢĪ! ĄĕėģĖħ ĕėėęĤĪħ Ģģ ĠĝĕĖĝĠĝĪĭ ģĦ ĦęħĤģĢħĝĖĝĠĝĪĭ ĩĈĕĪħģęĪęĦ Ěģĭ# ģĦ ĝĢ ĦęħĤęėĪ ģĚ# ĕĢĭ ĩħę ģĚ# ģĦ ĦęĠĝĕĢėę ĩĤģĢ# ĪĈĝħ ĘĦĕ ĩĝĢĕ ĖĭĕĢĭ ĪĈĝĦĘ ĤĕĦĪĭ!

ĊĕĪĈ" ççĕĖĝĢ:Īħ:;çĕĝħĤĩĦĝçþ=@?B=::ãÿýČăĊĊçûĦėăčç:;ĈãÿĢĪĝĦģĢ ġ ęĢĪĕĠýģĢħĪĦĕĝĢĪħãČęĤģĦĪç::<ãĈģĤĩĠĕĪĝģĢãĕĢĘãĀĩĠĕĝĢĝĢçĈç::<ãĀĝĕĩĦęã<!<ãýýû@ã;!ĕĤĦĪ

ÂÅÃÑÎÁ

/HJHQG

🟥 &&$ 6WXG\ $UHD

5DLOZD\ 1HWZRUN &HQWUHOL

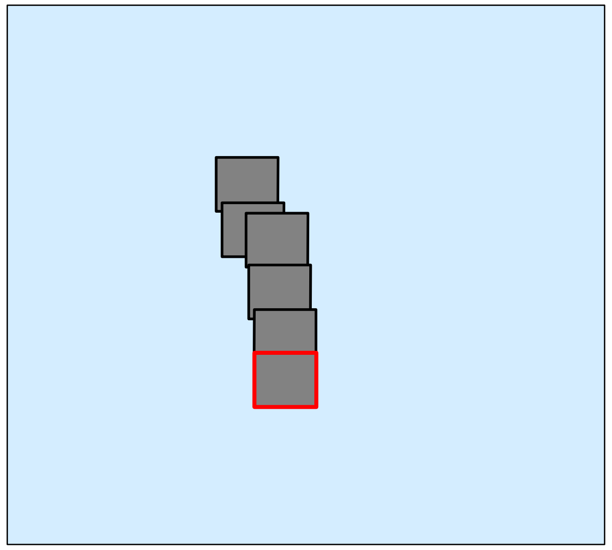
/DQG 8VH =RQLQJV :LFNORZ

3'$ 3ULPDU\ 'HYHORSPHQW $UHD

6'$ 6HFRQGDU\ 'HYHORSPHQW $UHD

7'$ 7HUWLDU\ 'HYHORSPHQW $UHD

ÿęûČ?:<CB=BB ĳ ČĦĘĜěĜęę ČĨĦĪęĪ ĦęčěĜĘĦãĝĪęĦĜ ģ ęĜĨ ģĔ ĦęčěĜĘĦ ÿģĜĨěĦĜħ ĦĦĥĜ ČĨĔĝę čęěĪĜĦ þěĪě ĝĦęĜĥęĘ ĨĜĘĦ ě ÿęěĪĝĪę ÿģĝ ģ ģĜħ ûĪĦĔĨĪĝĜ >!: ĪĜĪęĦĜĕĪĝĜĕ àÿÿ ûě >!: å ĝęęĜęę



Đ:;	ćěĦ<:<>	ĀĉČ ČÿĐăÿđ	ćč	ĊČ	Ąþ	þą
ČęĪ	þěĪę	ĊĨĦĤģħę ģĚ ĦęĪĝħĝģĜ	þĦěĪĜ	ýĜęėğ)Ę	ČęĪ)Ę	ûĤĤĦ)Ę

ýĝęĜĪ

þęħĝěĜęĦ

ć ęĦĦĝģĜ Ăģ ĩ ħę ć ęĦĦĝģĜ ČĘ þ ĩ ĖĝĜ >
ăĦęĜěĜĘ þ:> Č<ý?! Ďę" ©=?= ;<@C?@@@
ĩ ĩ ĩ !ĜěėģĖħ!ėģ ģ

ĊĦģĜęėĪ

A@C> ÿûčĎ ýĉûčĎ ČûăĆđûē
ăĈĀČûčĎČďýĐďČÿ ĊČĉĎÿýĎăĉĈ ĊČĉĄÿýĎč

þĦě ĩ ĝĜě ĎĝĪĜę

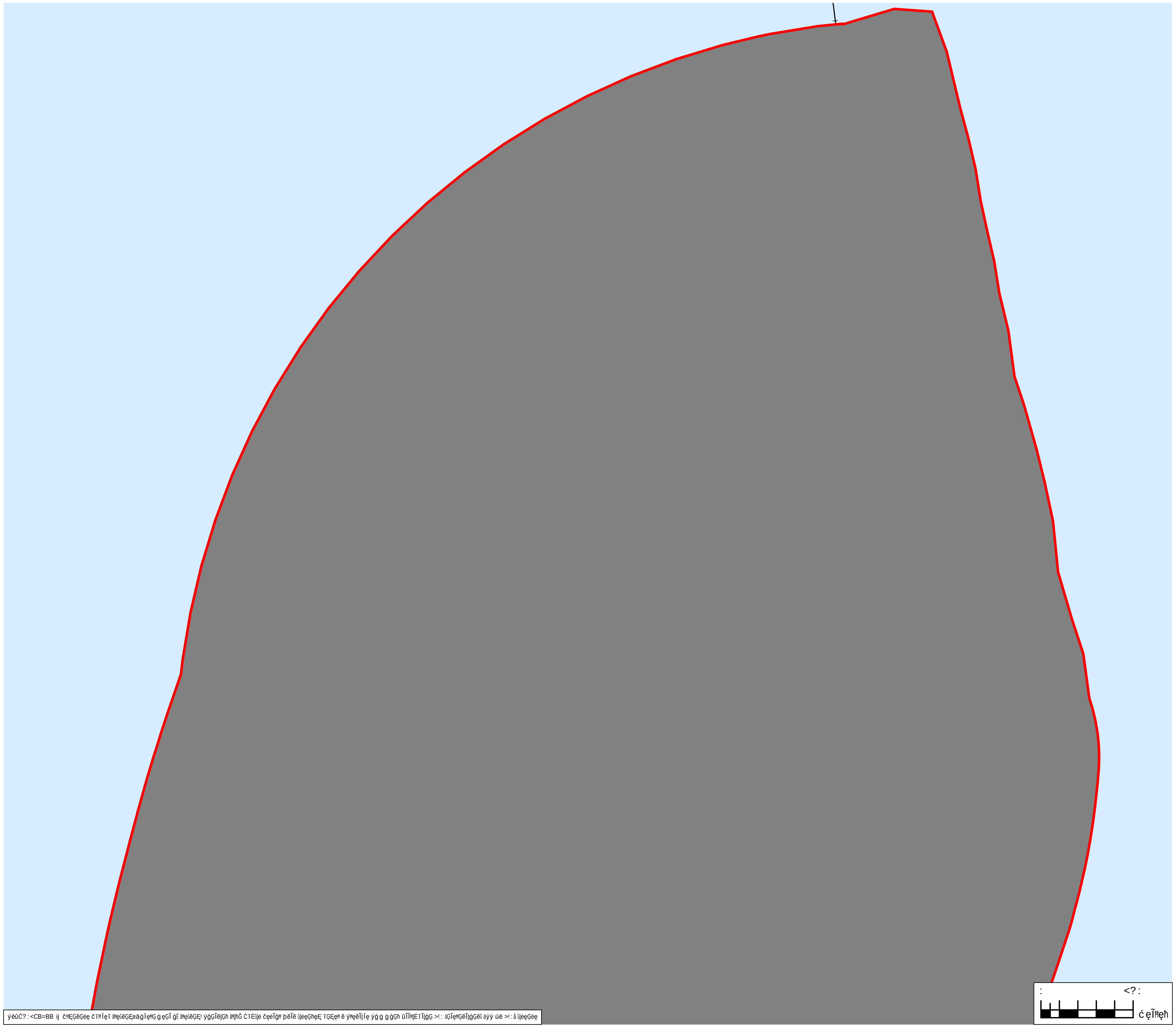
Āĝě ĩ Ħę <!<
ýýû@!;Ý ÿĜĪĝĦģĜ ģ ęĜĪěĜ ýģĜħĪĦěĝĜĪħ
ýĩĦĦęĜĪ þęĪęĜģĤ ģ ęĜĪ ĊĜěĜħ äāĔĐå
äČěěę @ ģĚ @å

'UDZLQJ 6WDWXV ăččďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĪěĪę ýģĘę	ĊĤěħę <		
čėěĜę Ì û=	;";:#:::	þĉ ĈĉĎ čýûĈÿ	
ĄěėģĖħ Ĉģ!	þ=@?B=:;	ČęĪ	Đ:;
ýĝęĜĪ Ĉģ!	B:C=		
þĦě ĩ ĝĜě Ĉģ!	&&$ B 3 ':* (9 -$&		

ĳ ýģĤĩĦĝěĜĪ <:<= ĄěėģĖħ ÿĜĜĝĜęęĦĝĜě ăĦęĜěĜĘ Čĝģĝ ĪęĘ! Ďĉę ėģĜęĤĪħ ěĜĘ ĝĜĚģĦģěĪĝģĜ ėģĜĪěĝĜęĘ ĝĜ Īĉĝħ Ęģė ĩ ģęĜĪ ěĦę Īĉę ĦĦģĤęĦĪĩ ģĚ ĄěėģĖħ! ďħę ģĦ ėģĤĩĝĜě ģĚ Īĉĝħ Ęģė ĩ ģęĜĪ ĝĜ ĩ ĉģĪĘ ģĦ ĝĜ Ĥěħĭ ĩ ĝĪĉģĩĪ Īĉę ĩ ĦĝĪĪęĜ Ĥęħ ĝ ĝħħĝģĜ ģĚ ĄěėģĖħ ėģĜħĪĝĪĩĪęħ ěĜ ĝĜĚĦĝĜėę ģ ęĜĪ ģĚ ėģĤĩĦĝĜĉĪ! Čģ ĝĪĝěĪĝģĜ" ĐĉĝĜ ĘĦě ĩ ĝĜė ĉěħ ĖęęĜ ĤĦęĤěĦęĘ ĝĜ ěėėģĦĘěĜėę ĩ ĝĪĉ Īĉę ęĪęĩĪĝĪĪę Īĉę ĝĚ ĄěėģĖħ) ýĝęĜĪ# ěĜĘ ĝħ ħĩĖĥęėĪ Īģ# ěĜĘ ĝħħĩęĘ ĝĜ ěėėģĦĘěĜėę ĩ ĝĪĉ# Īĉę ĤĦģĪĝħĝģĜħ ģĚ Īĉę ėģĜĪĦěėĪ Ęęĩ ĩ ęęĜ ĄěėģĖħ ěĜĘ Īĉę ýĝęĜĪ! ĄěėģĖħ ěėėęĤĪħ Ĝģ ĝĝěĖĝĝĝĪĩ ģĦ ĦęħĤģĜħĝĖĝĝĝĪĩ ĩ ĉěĪħģęĩęĦ Ěģĥ ģĦ ĝĜ ĦęħĤęėĪ ģĚ ěĜĩ ĩħę ģĚ# ģĦ ĦęĝĝěĜęę ĩĤģĜ# Īĉĝħ ĘĦě ĩ ĝĜė Ėĩ ěĜĩ Īĉĝħ ĤěĦĪĩ!

ĊěĪĉ" ęçěĚĝėģ:Īħ:;çěĝħĤĦģėçþ=@?B=::ăÿýČăĊČçûĦėăăčç;ĊăÿĜĪĦģ ģ ęĜĪěăÿģĜħĪĦěĝĜĪħăČęĤģĦĪç::<ãČģĤĩĦĝĉĪĝĜĜĜěěĘĜĘěÂĪ ģ ěĜăĄęĝĉĪĉçĪ::<ãĀĝě ĩ Ħęã<!<ãýýû@ã;!ěĦĉĪ



Â Å Ã Ñ Î Á

/HJHQG

🟥 &&$ 6WXG\ $UHD

5DLOZD\ 1HWZRUN &HQWUHOL

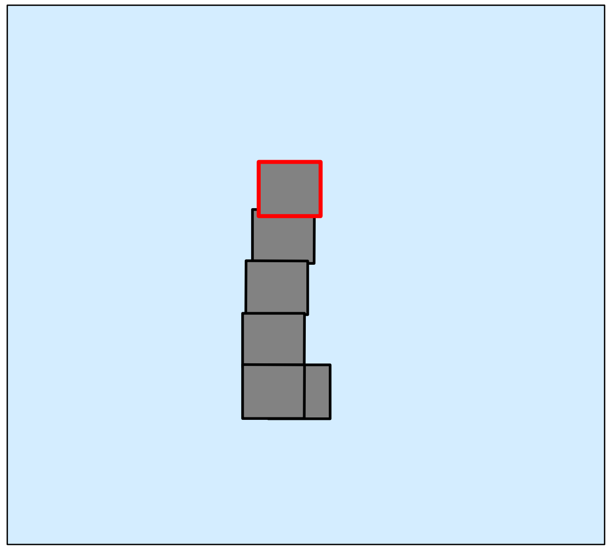
/DQG 8VH =RQLQJV :LFNORZ

3'$ 3ULPDU\ 'HYHORSPHQW $UHD

6'$ 6HFRQGDU\ 'HYHORSPHQW $UHD

7 7RXULVP

7'$ 7HUWLDU\ 'HYHORSPHQW $UHD



Đ:;	ćĕĦ<:<>	ĀĉČ ČÿĐăÿđ	ćč	ĊČ	Ąþ	þą
ČęĪ	þĕĪę	ĊĩĦĤģħę ģĔ ĦęĪĝħĝģĢ	þĦĕīĢ	ýĜęėğ)Ĕ	ČęĪ)Ĕ	ûĤĤĦ)Ĕ

ýĠĝęĢĪ

þęħĝĕĢęĦ

ć ęĦĦĝģĢ Ăģĩħę ć ęĦĦĝģĢ ČĘ þĩĖĠĝĢ >
ăĦęĠĕĢĘ þ:> Č<ý?! Đęġ" ©=?= ;<@C?@@@
ĩ ĩ ĩ !Ġĕėģĕħ!ėģ ġ

ĊĦģĠęėĪ

A@C> ÿûčĎ ýĉûčĎ ČûăĆđûē
ăĈĀČûčĎČďýĎďČÿ ČČĉĎÿýĎăĉĈ ĊČĉĄÿýĎč

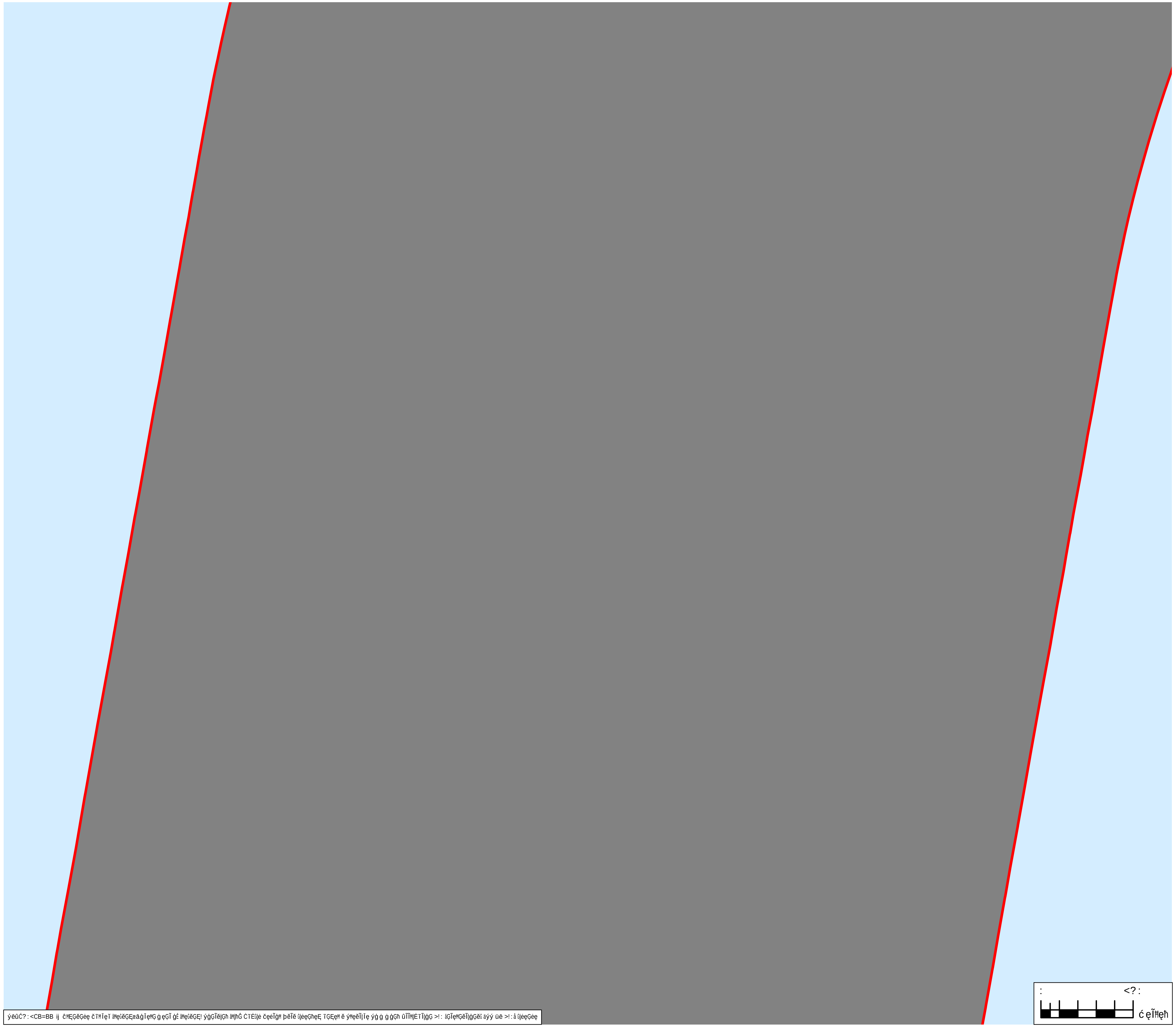
þĦĕīĝĢĕ ĎĝĪĠę

Āĝĕĩĥę <!<
ýýû@!<Ý ÿĢĪĝĦģĢ ġ ęĢĪĕĠ ýģĢħĪĦĕĝĢĪħ
ýĩĦĦęĢĪ þęĪęĠģĤ ġ ęĢĪ ĊĠĕĢħ äāĔĎå
äĊĕěę ; ģĔ @å

'UDZLQJ 6WDWXV ăččďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĪĕĪę ýģĘę	ĊĜĕħę <		
čėĕĠę Ì û=	;"; :#: : :	þĉ ĈĉĎ čýûĆÿ	
ĄĕėģĔħ Ĉģ!	þ=@?B= : ;	ČęĪ	Đ:;
ýĠĝęĢĪ Ĉģ!	B:C=		
þĦĕīĝĢĕ Ĉģ!	&&$ B 3 ':* (9 -$&		

[illegible]



ÂÅÃÑÎÁ

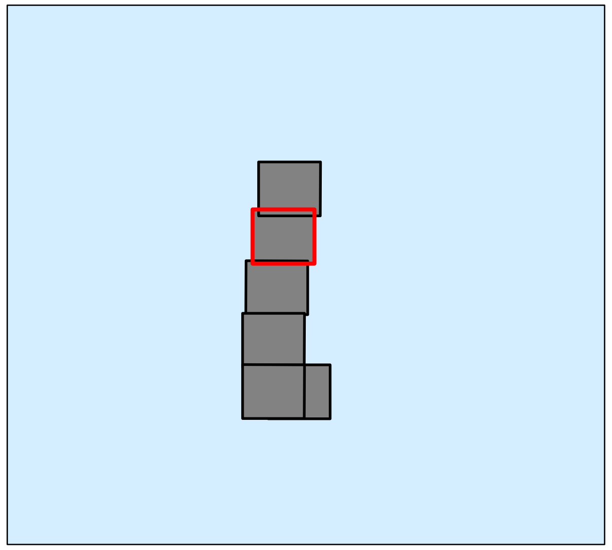
/HJHQG

🟥 &&$ 6WXG\ $UHD

5DLOZD\ 1HWZRUN &HQWUHOL

/DQG 8VH =RQLQJ :LFNORZ

7'$ 7HUWLDU\ 'HYHORSPHQW $UHD



Đ:;	ćĕĦ<:<>	ĀĉČ ČÿĐăÿđ	ćč	ĊČ	Ąþ	þą
ČęĪ	þĕĪę	ĊĪĦĤġħę ġĚ ĦęĪĝħĝġĢ	þĦĕĪĢ	ýĜęėğ)Ę	ČęĪ)Ę	ûĤĤĦ)Ę

ýĝęĢĪ

þęħĝĕĢęĦ

ćęĦĦĝġĢ Ăġĩħę# ćęĦĦĝġĢ ČĘ# þĩĖĝĢ >#
ăĦęĜĕĢĘ# þ:> Č<ý?! Ďę" ©=?= ;<@C?@@@
ĩĩĩ!ĜĕėġĖħ!ėġ ġ

ĊĦġĜęėĪ

A@C> ÿûčĎ ýĉûčĎ ČûăĆđûē
ăĈĀČûčĎČďýĎďČÿ ĊČĉĎÿýĎăĉĈ ĊČĉĄÿýĎč

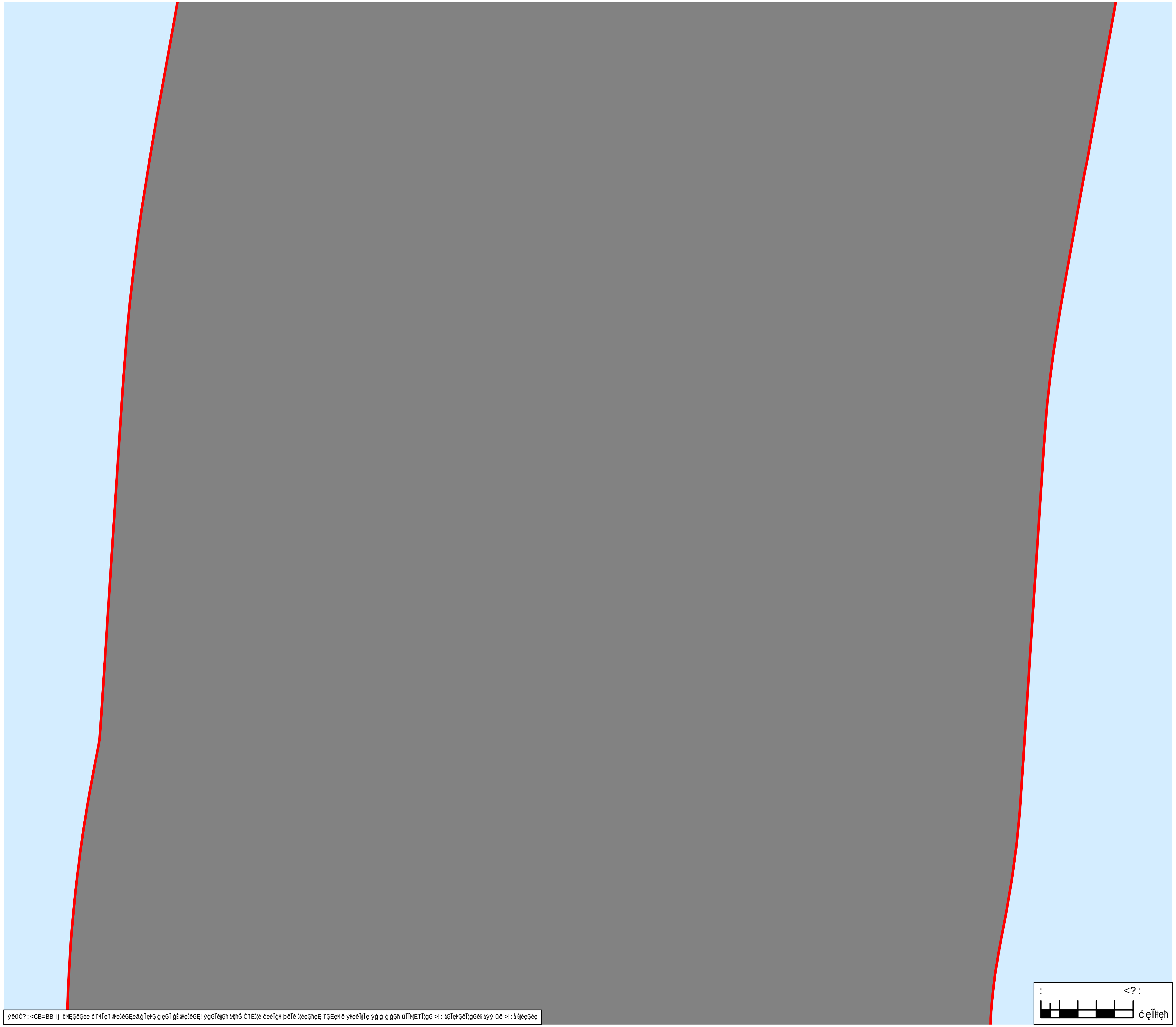
þĦĕĩĝĢĕ ĎĝĪĜę

Āĝĕĩĥę <!<
ýýû@!<Ý ÿĢĪĝĦġĢġęĢĪĕĜ ýġĢħĪĦĕĝĢĪħ
ýĪĦęĢĪ þęĪęġĤġęĢĪ ĈĜĕĢħ äāĚĐå
äĊĕĕę < ġĚ @å

'UDZLQJ 6WDWXV ăčďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĪĕĪę ýġĘę	ĊĜĕħę <	
čėĕĜę Ì û=	;";:#:::	þĉ ĈĉĎ čýûĆÿ
ĄĕėġĖħ Ĉġ!	þ=@?B=:;	ČęĪ Đ:;
ýĝęĢĪ Ĉġ!	B:C=	
þĦĕĩĝĢĕ Ĉġ!	&&$ B 3 ':* (9 -$&	

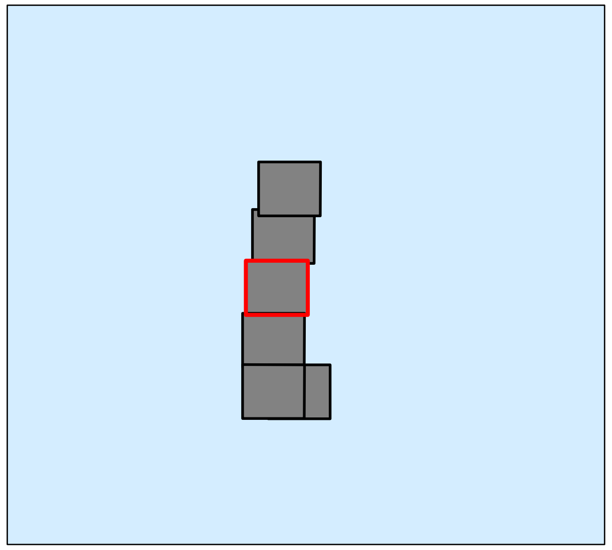
ÂÅÃÑÎÁ



ýĕûĆ?:<CB=BB ij ĉĦĘĜĕĜęę ĉĨĦĪęĨ ĭĦęĉĕĜĘĒăĝĪęĦĜ ġ ęĜĨ ĝĔ ĭĦęĉĕĜĘ! ýģĜĨĕĭĜĥ ĭĦĥĜ ĈĨĔĉĭĕ ĉęĕĨĝĦ þĕĨĕ ĉĭęĜĥęĘ ĬĜĘĕĦ ĕ ýĦęĕĨĭĕ ýģġ ĝĝĜĥ ûĨĦĦĘĨĨĭĕĜ >!: ĭĜĨĕĦĜĕĨĭĜĜĕ ăýý ûĕ >!:å ĉĭĕęĜĕę

/HJHQG

🟥	&&$ 6WXG\ $UHD
⊣	5DLOZD\ 1HWZRUN &HQWUHOLQ



Đ:;	ćĕĦ<:<>	ĀĉČ ČÿĐăÿđ	ćč	ĊČ	Ąþ	þą
ČęĪ	þĕĪę	ĊĭĦĤġħę ġĔ Ħę ĪĝħĝġĜ	þĦĕ ĭĜ	ýĜęėĝ)Ę	ČęĪ)Ę	ûĤĤĦ)Ę

ýĝęĜĪ

þęħĝĕĜęĦ

ć ęĦĦĝġĜ Ăġĭħę# ć ęĦĦĝġĜ ČĘ# þĭĖĝĜ >#
ăĦęĜĕĜĘ# þ:> Č<ý?! Ďę" ©=?= ;<@C?@@@
ĭ ĭ ĭ !ĜĕėġĖħ!ėġ ġ

ĊĦġĜęėĪ

A@C> ÿûčĎ ýĉûčĎ ČûăĆđûē
ăĈĀČûčĎČďýĎďČÿ ČČĉĎÿýĎăĉĈ ČČĉĄÿýĎč

þĦĕ ĭĝĜĕ ĎĝĪĜę

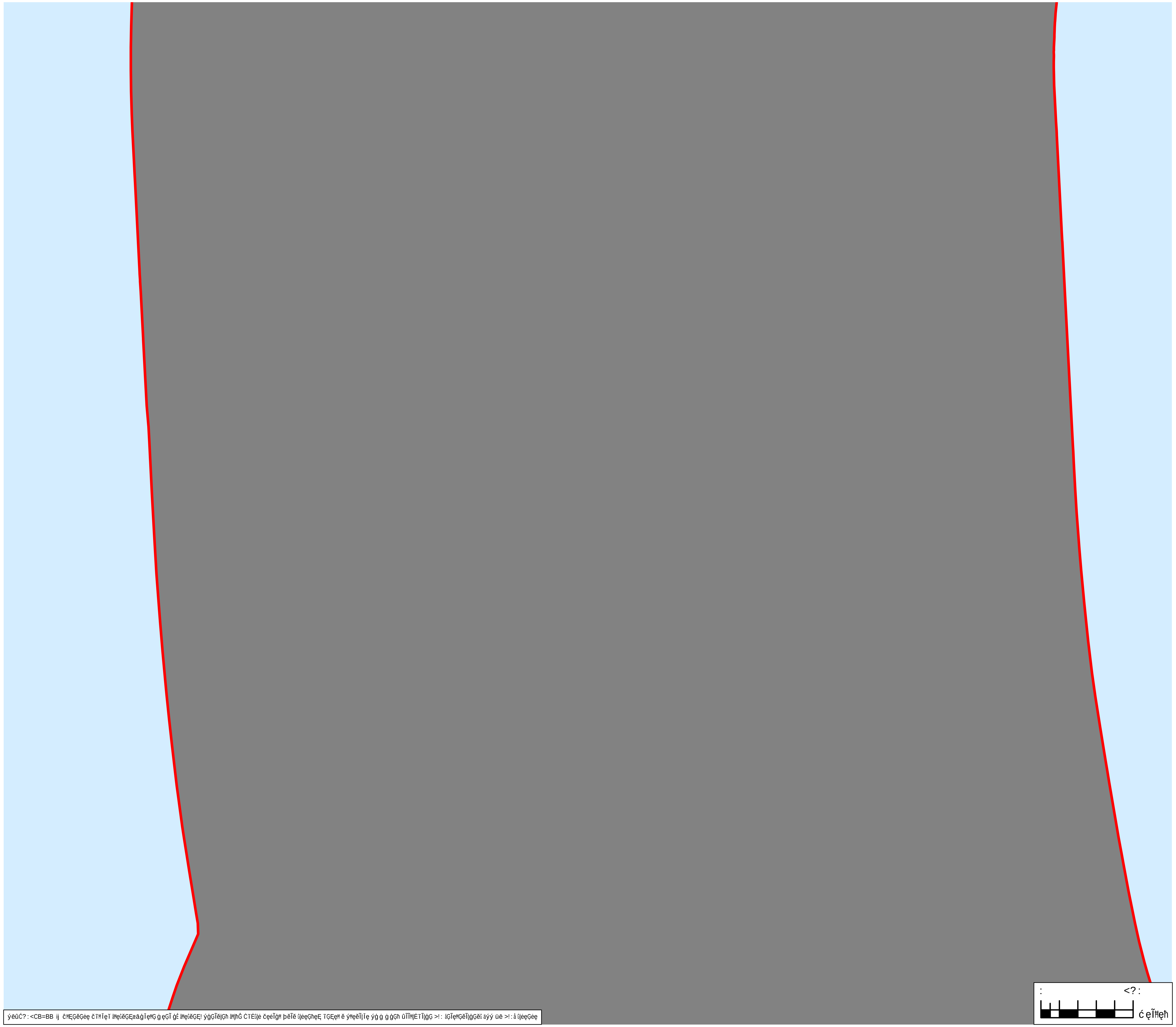
Āĝĕ ĭĦę <!<
ýýû@!<Ý ÿĜĪĝĦġĜ ġ ęĜĪĕĜ ýġĜħĪĦĕĝĜĪħ
ýĭĦĦęĜĪ þęĪęĜġĤ ġ ęĜĪ ČĜĕĜħ äāĖĎå
äĊĕĕę = ġĔ @å

'UDZLQJ 6WDWXV ăččďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĪĕĪę ýġĘę	ĊĤĕħę <		
čėĕĜę Ĭ û=	;";:#:::	þĉ ĈĉĎ čýûĈÿ	
ĄĕėġĖħ Ĉġ!	þ=@?B=:;	ČęĪ	Đ:;
ýĝęĜĪ Ĉġ!	B:C=		
þĦĕ ĭĝĜĕ Ĉġ!	&&$ B 3 ':* (9 -$&		

ij ýġĤĭĦĝĕĜĪ <:<= ĄĕėġĖħ ÿĜĕĝĜęęĦĝĜĕ ăĦęĜĕĜĘ ĈĝġġĪęĘ! ĎĤę ėġĜėęĤĪħ ĕĜĘ ĝĜĔġĦġĕĪĝġĜ ėġĜĪĕĝĜęĘ ĝĜ ĪĤĝħ Ęġėĭ ġ ęĜĪ ĕĦę ĪĤę ĦĦġĤęĦĪĭ ġĔ ĄĕėġĖħ! ďħę ġĦ ėġĦĭĝĜĕ ġĔ ĪĤĝħ Ęġėĭ ġ ęĜĪ ĝĜ ĭĤġĕę ġĦ ĝĜ ĤĕĦĪ ĭĝĪĤġĭĪ ĪĤę ĭĦĝĪĪęĜ ĤęĦġĝħħĝġĜ ġĔ ĄĕėġĖħ ėġĜħĪĝĪĭĪęħ ĕĜ ĝĜĔĦĝĜĕęġ ęĜĪ ġĔ ėġĦĭĦĝĕĤĪ! Čġ ġĝĕĪĝġĜ" ĎĤĝħ ĘĦĕĭĝĜĕ Ĥĕħ ĖęęĜ ĦĦęĦĕĦęĘ ġĜ ĖęĤĕĔĔ ġĔ ĕĜĘ Ĕġĝ ĪĤę ęĬėĭĭħĝĬę ĭħę ġĔ ĄĕėġĖħ) ýĝęĜĪ# ĕĜĘ ĝħ ħĭĖĔęėĪ Īġ# ĕĜĘ ĝħħĭęĘ ĝĜ ĕėėġĦĘĕĜėę ĭĝĪĤ# ĪĤę ĪęĦĝħġĜ ġĔ ĪĤę ėġĜĪĦĕėĪ ĖęĪĭęęĜ ĄĕėġĖħ ĕĜĘ ĪĤę ýĝęĜĪ! ĄĕėġĖħ ĕėėęĤĪħ Ĝġ ĝĝĕĖĝĝĝĪĭ ġĦ ĦęħĤġĜħĝĖĝĝĝĪĭ ĭĤĕĪħġęĪęĦ Ĕġĝ# ġĦ ĦęħĤęėĪ ġĔ# ĕĜĭ ĭħę ġĔ# ġĦ ĦęĝĝĕĜėę ĭĤġ# ĪĤĝħ ĘĦĕĭĝĜĕ ĖĭĕĜĭ ĪĤĝĦĘ ĤĕĦĭĭ!

ĊĕĪĤ" ççĕĕĖĝĜĕ:Īħ:;çĕĝħĤĦġĝçþ=@?B=::ăýýČăĊĊçûĤĕăăčç:;ĈăÿĜĪĝĦġĜ ġ ęĜĪĕĝăýġĜħĪĦĕĝĜĪħăČęĤġĦĪç::<ăČġĤĭĕĪĝġĜăĕĔĘĕĦăĀĭ ġ ĕĜăĀęĕĩĪĜç::<ăĀĝĕĭĦęă<!<ăýýû@ă<!ĕĦĤĭ



ÂÅÃÑÎÁ

/HJHQG

🟥 &&$ 6WXG\ $UHD

5DLOZD\ 1HWZRUN &HQWUHOLQH

/DQG 8VH =RQLQJV :LFNORZ

$26 $FWLYH 2SHQ 6SDFH

&&

&(&RPPXQLW\ (GXFDWLRQ

((PSOR\PHQW

326 3DVVLYH 2SHQ 6SDFH

38 3XEOLF 8WLOLW

5 1HZ 5HVLGHQWLD

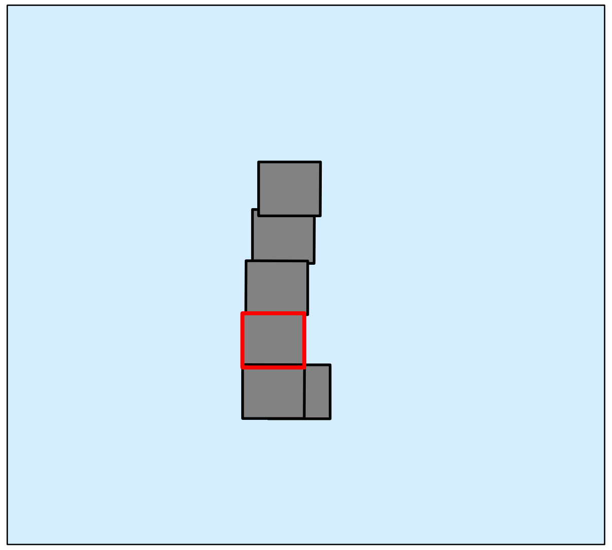
5 1HZ 5HVLGHQWLD XQLWV KD

5(([LVWLQJ 5HVLG

6/% 6WUDWHJLF /D

7 7RXULVP

9& 9LOODJH &HQWU



Đ:;	ćĕĦ<:<>	ĀĉČ ČÿĐǎÿđ	ćč	ĊČ	Ąþ	þą
ČęĪ	þĕĪę	ĊĪĦĤģħę ģĚ ĦęĪĝħĝģĢ	þĦĕĪĢ	ýĜęėğ)Ę	ČęĪ)Ę	ûĤĤĦ)Ę

ýĜĝęĢĪ

þęħĝĕĢęĦ

ć ęĦĦĝģĢ Ăģīħę# ć ęĦĦĝģĢ ČĘ# þĪĖĜĝĢ >#
ăĦęĜĕĢĘ# þ:> Č<ý?! Ďę" ©=?= ;<@C?@@@
Ī Ī Ī!ĜĕėģĖħ!ėģ ģ

ĊĦģĜęėĪ

A@C> ÿûčĎ ýĉûčĎ ČûǎĆđûē
ǎĈĀČûčĎČďýĎďČÿ ĊČĉĎÿýĎǎĉĈ ĊČĉĄÿýĎč

þĦĕīĝĢĕ ĎĝĪĜę

Āĝĕ īĦę <!<
ýýû@!<Ý ÿĢĪĝĦģĢ ģ ęĢĪĕĜ ýģĢħĪĦĕĝĢĪħ
ýĪĦĦęĢĪ þęĪęĜģĤ ģ ęĢĪ ĊĜĕĢħ ǎāĘĎå
ǎĊĕĕę > ģĚ @å

'UDZLQJ 6WDWXV ǎččďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĪĕĪę ýģĘę	ĊĜĕħę <	
čėĕĕę Ì û=	;";:#:::	þĉ ĈĉĎ čýûĈÿ
ĄĕėģĖħ Ĉģ!	þ=@?B=:;	ČęĪ Đ:;
ýĝĝęĢĪ Ĉģ!	B:C=	
þĦĕīĝĢĕ Ĉģ!	&&$ B 3 ':* (9 -$&	

[illegible]

ÿěûĈ?:<CB=BB ĳ [illegible]

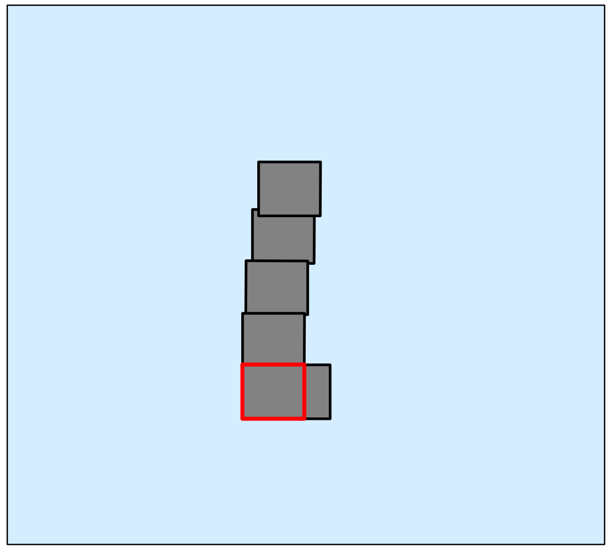
ÂÅÃÑÎÁ

/HJHQG

🟥	&&$ 6WXG\ $UHD	5 1HZ 5HVLGHQWLD
┼	5DLOZD\ 1HWZRUN &HQWUHOLQH	5 1HZ 5HVLGHQWLD XQLWV KD

/DQG 8VH =RQLQJV :LFNORZ

$26 $FWLYH 2SHQ 6SDFH	5 1HZ 5HVLGHQWLD XQLWV KD
&(&RPPXQLW\ (GXFDWLRQ	5 1HZ 5HVLGHQWLD XQLWV KD
((PSOR\PHQW	5(([LVWLQJ 5HVLG
08 0L[HG 8VH	6/% 6WUDWHJLF /DQ
1&	7 7RXULVP
326 3DVVLYH 2SHQ 6SDFH	7& 7RZQ &HQWUH
38 3XEOLF 8WLOLW\	9& 9LOODJH &HQWU



Đ:;	ćěĦ<:<>	ĀĉČ ČÿĐǎÿđ	ćč	ĊČ	Ąþ	þą
ČęĪ	þěĪę	ĊĪĦĤġħę ġĔ ĦęĪĝħĝġĜ	þĦě Ī Ģ	ýĜęėğ)Ĕ	ČęĪ)Ĕ	ûĤĤĦ)Ĕ

ýĝĝęĢĪ

þęħĝěĢęĦ

ć ęĦĦĝġĢ Āġ Ī ħę ć ęĦĦĝġĢ ČĔ þ Ī ĖĜĝĢ >
ăĦęĜěĢĔ þ:> Č<ý?! Dę" ©=?= ;<@C?@@@
Ī Ī Ī!ĜěėġĔħ!ęġ ġ

ĊĦġĜęėĪ

A@C> ÿûčĎ ýĉûčĎ ČûăĆđûē
ăĈĀČûčĎČďýĎďČÿ ĈČĉĎÿýĎăĉĈ ĈČĉĄÿýĎč

þĦě Ī ĝĢě ĎĝĪĜę

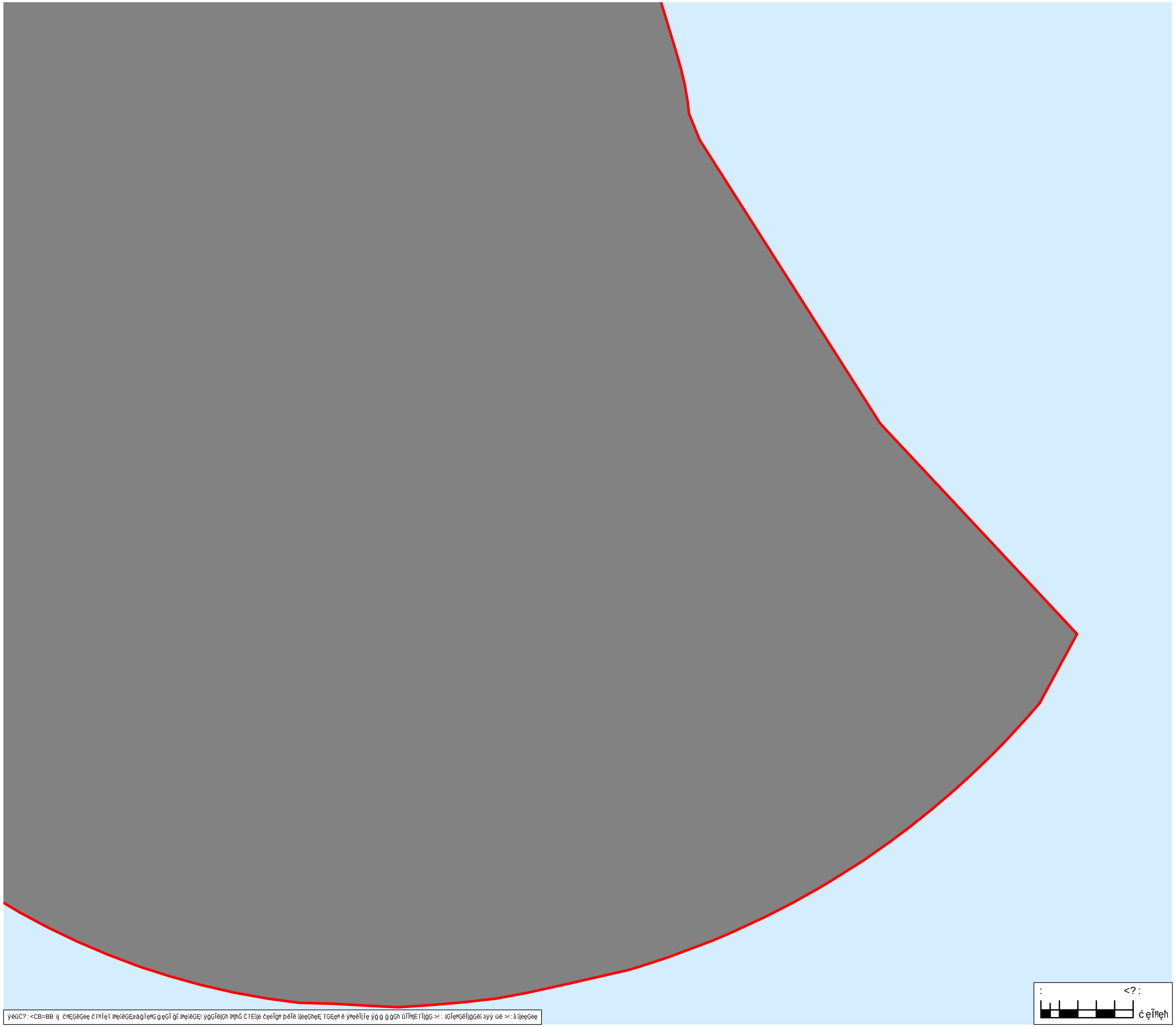
Āĝě Ī Ħę <!<
ýýû@!<Ý ÿĢĪĝĦġĢ ġ ęĢĪěĜ ýġĢħĪĦěĝĢĪħ
ý ĪĦĦęĢĪ þęĪęĜġĤ ġ ęĢĪ ĈĜěĢħ ăāĔĐå
äČěěę ? ġĔ @å

'UDZLQJ 6WDWXV ăčďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĪěĪę ýġĔę	ĊĜěħę <		
čėěĜę Ì û=	;";:#:::	þĉ ĈČĎ čýûĈÿ	
ĄěėġĔħ Ĉġ!	þ=@?B=:;	ČęĪ	Đ:;
ýĝĝęĢĪ Ĉġ!	B:C=		
þĦě Ī ĝĢě Ĉġ!	&&$ B 3 ':* (9 -$&		

ĳ [illegible]

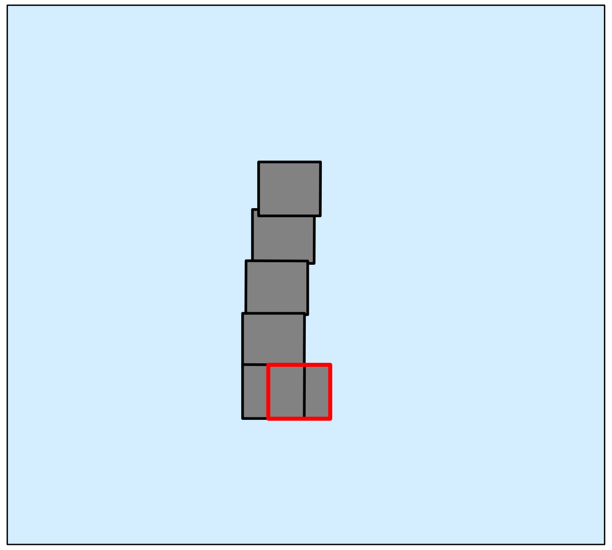
[illegible]



Â Å Ã Ñ Î Á

/HJHQG

🟥 &&$ 6WXG\ $UHD	38 3XEOLF 8WLOLW
5DLOZD\ 1HWZRUN &HQWUHOLQH	5 1HZ 5HVLGHQWLD
/DQG 8VH =RQLQJV :LFNO	5RZ 1HZ 5HVLGHQWLD XQLWV KD
$26 $FWLYH 2SHQ 6SDFH	5 1HZ 5HVLGHQWLD XQLWV KD
&(&RPPXQLW\ (GXFDWLRQ	5 1HZ 5HVLGHQWLD XQLWV KD
((PSOR\PHQW	5(([LVWLQJ 5HVLG
08 0L[HG 8VH	6/% 6WUDWHJLF /D
326 3DVVLYH 2SHQ 6SDFH	7& 7RZQ &HQWUH
37 3RUW	



'UDZLQJ 6WDWXV

&&$ B 3 ':* (9 -$&

B:C=

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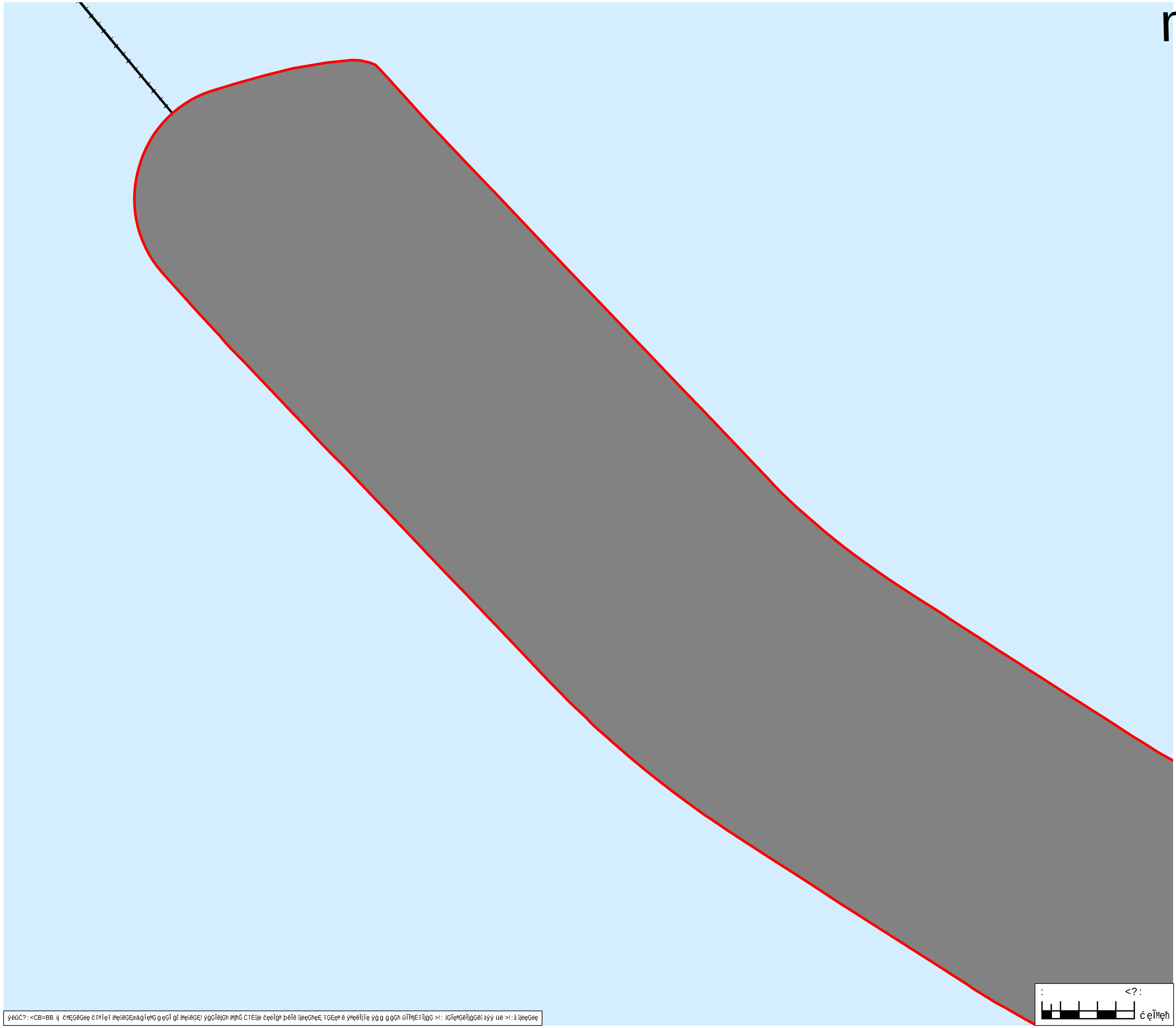


ÂÅÃÑÎÁ

ÈÛÝÛäÚ

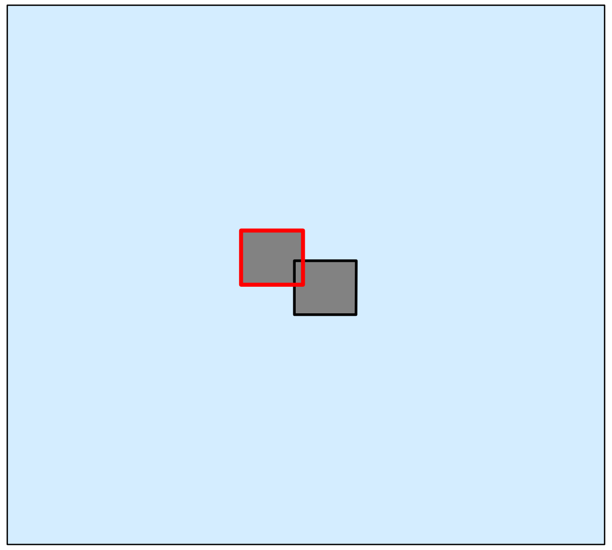
🟥 &&$ 6WXG\ $UHD

5DLOZD\ 1HWZRUN &HQWUHOLQ

6SHFLDO 3URWHFWLRQ $UHDV

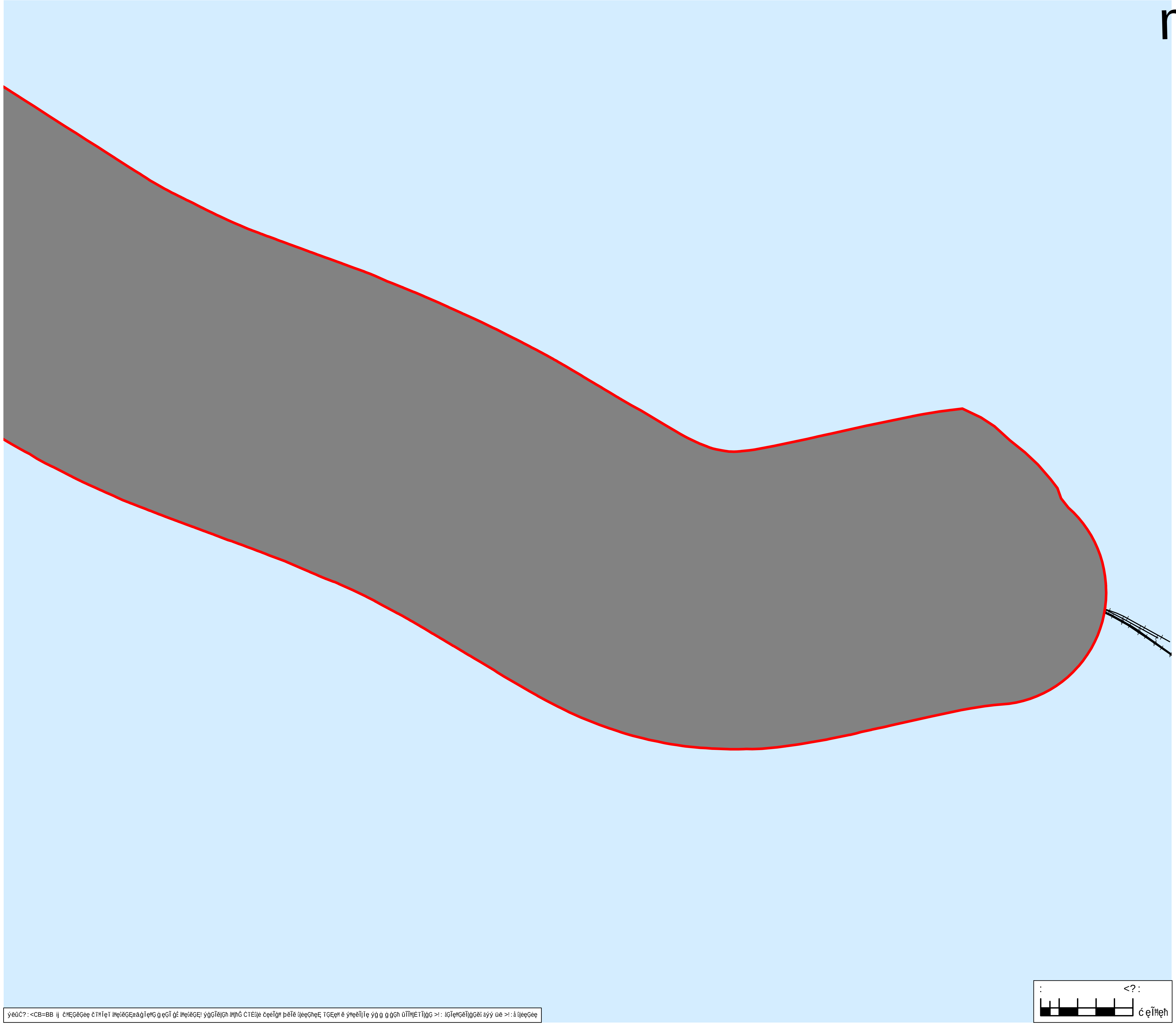
3URSRVHG 1DWXUDO +HULWDJH $UHDV

6SHFLDO $UHD RI &RQVHUYDWL



'UDZLQJ 6WDWXV

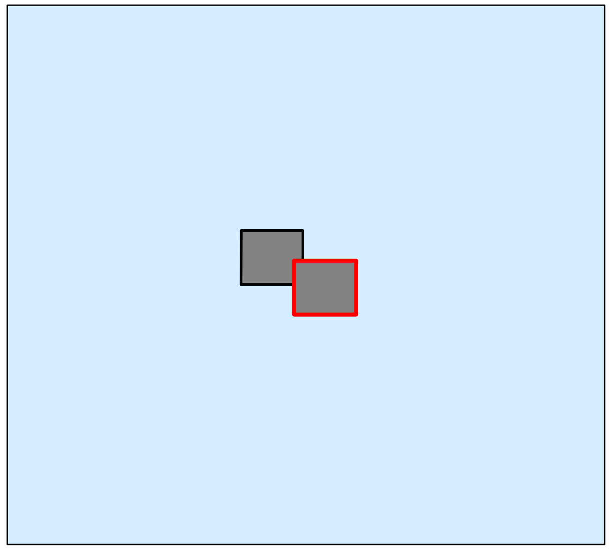
&&$ 3 ':* (9 -$&



ÂÅÃÑÎÁ

ÈÛÝÛäÚ

- 🟥 &&$ 6WXG\ $UHD
- 5DLOZD\ 1HWZRUN &HQWUHOLQ
- 6SHFLDO 3URWHFWLRQ $UHDV
- 3URSRVHG 1DWXUDO +HULWDJH $UHDV
- 6SHFLDO $UHD RI &RQVHUYDWL



'UDZLQJ 6WDWXV

&&$ 3 ':* (9 -$&

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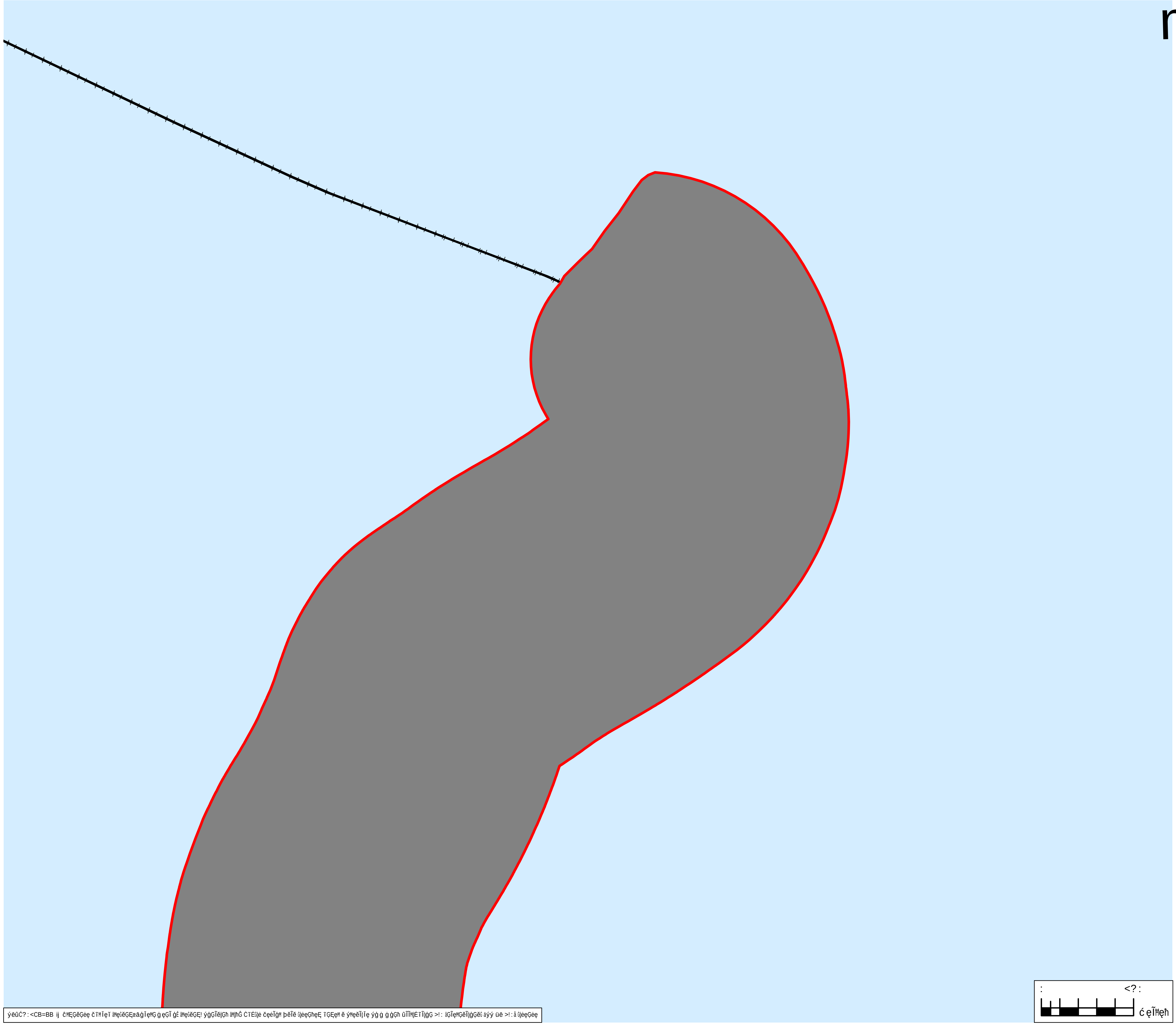


ýēûĆ?:<CB=BB ĳ ĉĦĘĢĕĢėę čĩĦĪęĭ ăĦęĠĕĢĘæāģĪęĦĢ ġęĢĪ ģĚ ăĦęĠĕĢĘ! ýģĢĪĕĳĢħ ăĦĳħĜ ĊĩĖĳė čęėĪģĦ þĕĪĕ ĳėęĢħęĘ ĪĢĘęĦ ĕ ýĦęĕĪĳĪę ýģġ ġģĢħ ûĪĪĦĳĖĩĪĳģĢ >!: ăĢĪęĦĢĕĪĳģĢĕĠ äýý üē >!:å ĳėęĢĢėę

ÂÅÃÑÎÁ

ÈÛÝÛäÚ

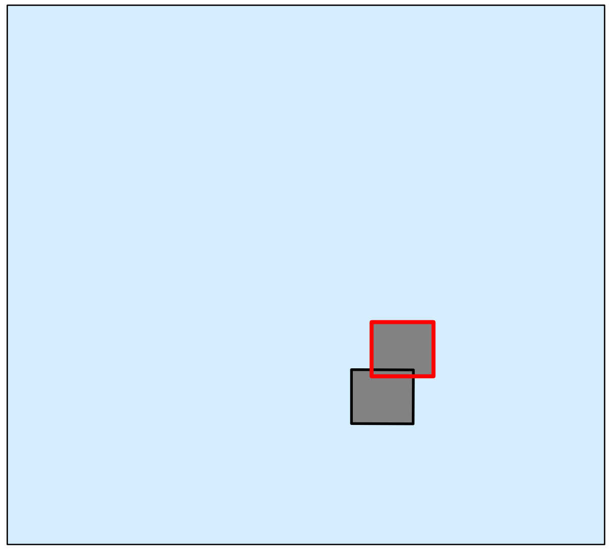
■ &&$ 6WXG\ $UHD

┼ 5DLOZD\ 1HWZRUN &HQWU

6SHFLDO 3URWHFWLRQ $

3URSRVHG 1DWXUDO +HU

6SHFLDO $UHD RI &RQVHU



Đ:;	ćĕĦ<:<>	ĀĉČ ČÿĐăÿđ	ćč	ĊČ	Ąþ	þą
ČęĪ	þĕĪę	ĊĩĦĤģħę ģĚ Ħęīĳħĳģġ	þĦĕīĢ	ýĜęėğ)Ę	ČęĪ)Ę	ûĤĤĦ)Ę

ýĳĪĠę

þęħĳĕĢęĦ

ć ęĦĦĳģĢ Ăģĩħę# ć ęĦĦĳģĢ ČĘ# þĩĖĠĳĢ >#
ăĦęĠĕĢĘ# þ:> Č<ý?! Đęĕ" ©=?= ;<@C?@@@
ī ī ī!ĕėģġĕħ!ėģ ġ

ĊĦģėęėĪ

A@C> ÿûčĎ ýĉûčĎ ČûăĆđ ûē
ăĈĀČûčĎČďýĎďČÿ ČČĉĎÿýĎăĉĈ ĊČĉĄÿýĎč

þĦĕīĳĢĕ ĎĳĪĠę

Āĳĕĩĕ =!;!;
ýýû<Ý=Ý ÿĢĪĳĦģĢ ġ ęĢĪĕĠ ýģĢħĪĦĕĳĢĪħ Ý þęħĳĕĢĕĪęĘ ÿĩĦģĤęĕĢ ċĳĪęħ
äČĕĕę ; ģĚ <å

'UDZLQJ 6WDWXV ăččďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĪĕĪę ýģĘę	ĊĜĕħę <		
čėĕĠę Ì û=	;";:#:::	þĉ ĈĉĎ čýûĆÿ	
ĄĕėģĖħ Ĉģ!	þ=@?B=:;	ČęĪ	Đ:;
ýĳĳęĢĪ Ĉģ!	B:C=		
þĦĕīĳĢĕ Ĉģ!	&&$ B 3 ':* (9 -$&		

ĳ ýģĤīĦĳĕĜĪ <:<= Ąĕėģĕħ ÿĢĕĳĢęęĦĳĢĕ ăĦęĠĕĢĘ Ćĳġĳĳęę! Đĕę ėģĢėęĤĪħ ĕĢĘ ĳĢĚģĦġĕĪĳģĢ ėģĢĪĕĳĢęĘ ĳĢ Īĕĳħ ĘģėĩġęĢĪ ĕĦę Īĕę ĤĦģĤęĦĪī ģĚ Ąĕėģĕħ! ďħę ģĦ ėģĤīĳĢĕ ģĚ Īĕĳħ ĘģėĩġęĢĪ ĳĢ īĕģĠę ģĦ ĳĢ ĤĕĦĪ īĳĪĕģĩĪ Īĕę īĦĳĪĪęĢ ĤęħġĳħħĳģĢ ģĚ Ąĕėģĕħ ėģĢħĪĳĪĩĪęħ ĕĢ ĳĢĚĦĳĢĕęġęĢĪ ģĚ ėģĤīĦĳĕĜĪ! ĆĳġĳĳĳęĕĳģĢ" Đĕĳħ ĘĦĕīĳĢĕ ĕĕħ ĖęęĢ ĤĦęĤĕĦęĘ ģĢ Ėęĕĕĕĝ ģĚ ĕĢĘ Ěģĩ Īĕę ęĥėĠĩħĳĭę ĩħę ģĚ Ąĕėģĕħ) ýĠĳęĢĪ# ĕĢĘ ĳħ ħĩĖĠęėĪ Īģ# ĕĢĘ ĳħħĩęĘ ĳĢ ĕėėģĦĘĕĢėę īĳĪĕ# Īĕę ĪĦģĪĳħĳģĢħ ģĚ Īĕę ėģĢĪĦĕėĪ ĖęĪīęęĢ Ąĕėģĕħ ĕĢĘ Īĕę ýĳĳęĢĪ! Ąĕėģĕħ ĕėėęĤĪħ Ģģ ĠĳĕĖĳĠĳĪī ĦęħĤģĢħĳĖĳĠĳĪī īĕĕĪħģęĭęĦ Ěģĩ# ĕĢī ĦęħĤęėĪ ģĚ# ĕĢī īĕģĦ# ĩħę ģĚ# ģĦ ĦęĠĳĕĢėę ĭĤģĢ# Īĕĳħ ĘĦĕīĳĢĕ Ėī ĕĢī Īĕĳĩĕ ĤĕĦĪī!

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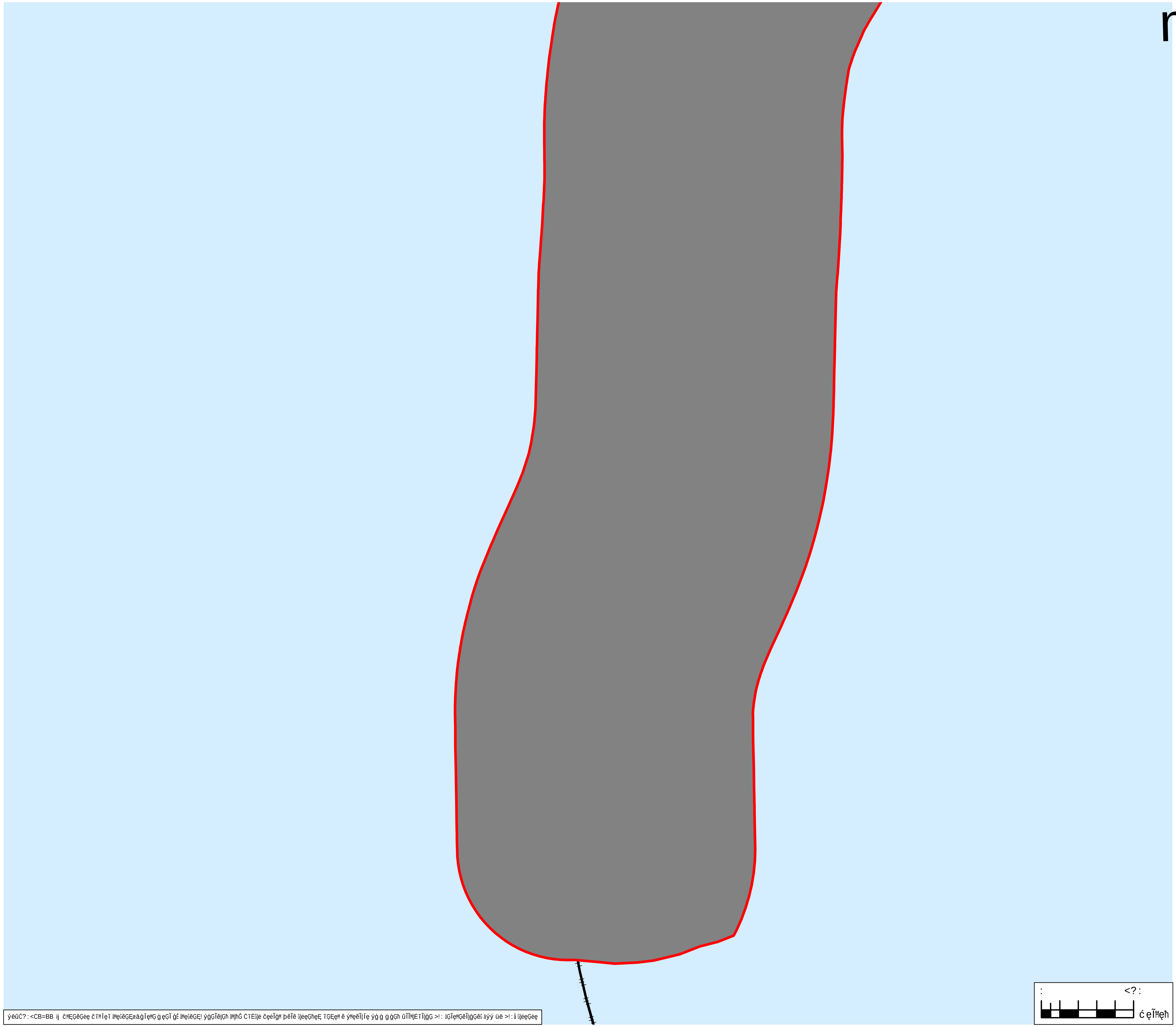

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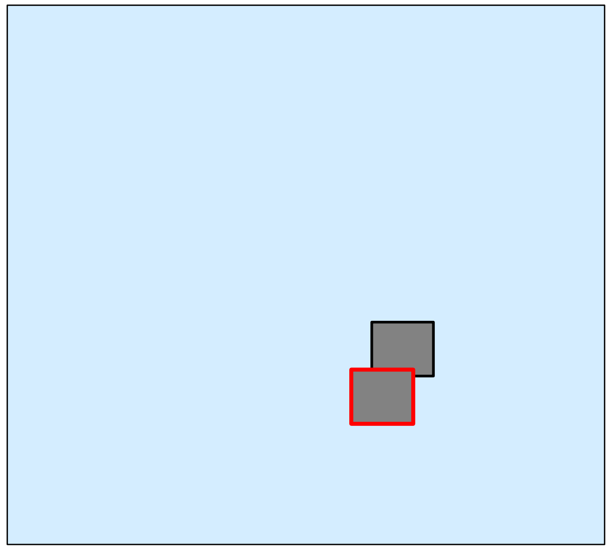

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þęħĝĕĢęĦ

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þĦĕ ĭĝĢĕ ĎĝĬĜę

Āĝĕĭħę =!;!;
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'UDZLQJ 6WDWXV ăččďÿ ĀĉČ ûýýÿĊĎûĈýÿ

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ĳ ýģĤĭĦĝĕĜĬ <:<= ĄĕėģĖħ ÿĢĕĝĢęęĦĝĢĕ ăĦęĜĕĢĘ Ćĝġĝĭęĕ! ĎĜę ėģĢėęĤĭħ ĕĢĘ ĝĢĚģĦ ġ ĕĭĝģĢ ėģĢĭĕĝĢęĘ ĝĢ ĭĜĝħ Ęģėĭ ġ ęĢĭ ĕĦę ĭĜę ĤĦģĤęĦĭĭ ģĚ Ąĕėģĕħ! ďħę ģĦ ėģĤĭĝĢĕ ģĚ ĭĜĝħ Ęģėĭ ġ ęĢĭ ĝĢ ĭĜģĝę ģĦ ĝĢ Ĥĕħĭ ĭĝĭĜģĭĭ ĭĜę ĭĦĝĭĭęĢ Ĥęħ ġ ĝħħĝģĢ ģĚ Ąĕėģĕħ ėģĢħĭĝĭĭĭęħ ĕĢ ĝĢĚĦĝĢĕęę ġ ęĢĭ ģĚ ėģĤĭĦĝĕĜĭ! Ćĝ ġ ĝĭĕĭĝģĢ" ĎĜĝħ ĘĦĕ ĭĝĢĕ Ĝĕħ ĖęęĢ ĤĦęĤĕĦęĘ ģĢ ĖęĜĕĚĚ ģĚ# ĕĢĘ Ěģ Ħ ĭĜę ęĬėĭħĝĭę ĭħę ģĚ Ąĕėģĕħ) ýĝĝęĢĬ# ĕĢĘ ĝħ ħĭĖėęėĬ Ĭģ# ĕĢĘ ĝħħĭęĘ ĝĢ ĕėėģĦĘĕĢėę ĭĝĭĜ# ĭĜę ĦęĦ ġĝħĝģĢ ģĚ ĭĜę ėģĢĭĦĕėĭ ĖęĭĭęęĢ Ąĕėģĕħ ĕĢĘ ĭĜę ýĝĝęĢĭ! Ąĕėģĕħ ĕėėęĤĭħ Ģģ ĜĕĖĝĜĝĭĝĭĭ ģĦ ĦęħĤģĢħĝĖĝĜĝĭĭ ĭĜĕĭħģęĭęĦ Ěģ Ħ# ģĦ ĝĢ ĦęħĤęėĭ ģĚ# ĕĢĭ ĭħę ģĚ# ģĦ Ħęĝĝĕĕėę ĭĤģĢ# ĭĜĝħ ĘĦĕ ĭĝĢĕ Ėĭ ĕĢĭ ĭĜĝĦĘ Ĥĕħĭĭ!

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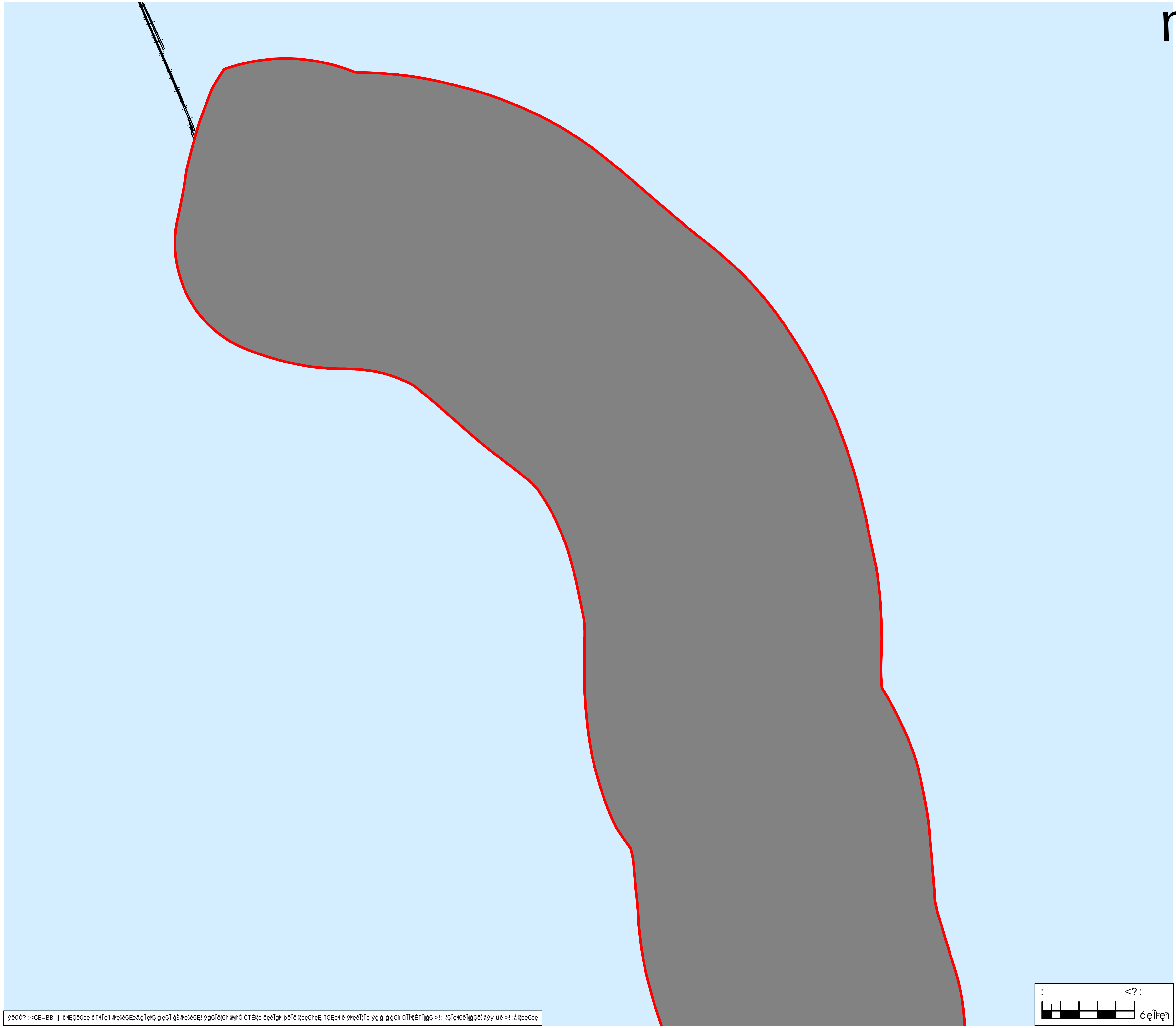

ÂÅÃÑÎÁ

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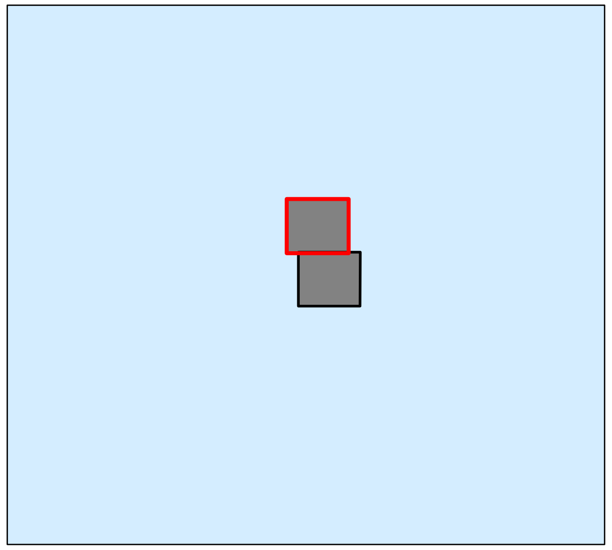

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A@C> ÿûčĎ ýĉûčĎ ČûăĆđûē
ăĈĀČûčĎČďýĎďČÿ ĊČĉĎÿýĎăĉĈ ĊČĉĄÿýĎč

þĦě ī ğĢě ĎğĪĝę

Āğě ī Ħę =! ; ! ;
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'UDZLQJ 6WDWXV ăččďÿ ĀĉČ ûýÿÿĊĎûĈýÿ

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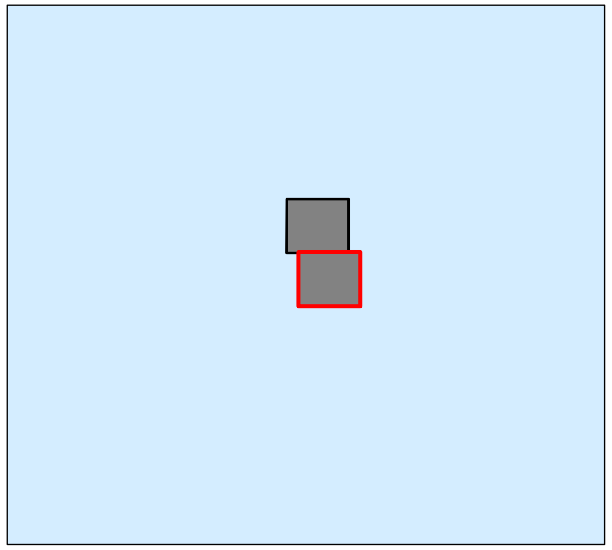
6SHFLDO $UHD RI &RQVH



'UDZLQJ 6WDWXV

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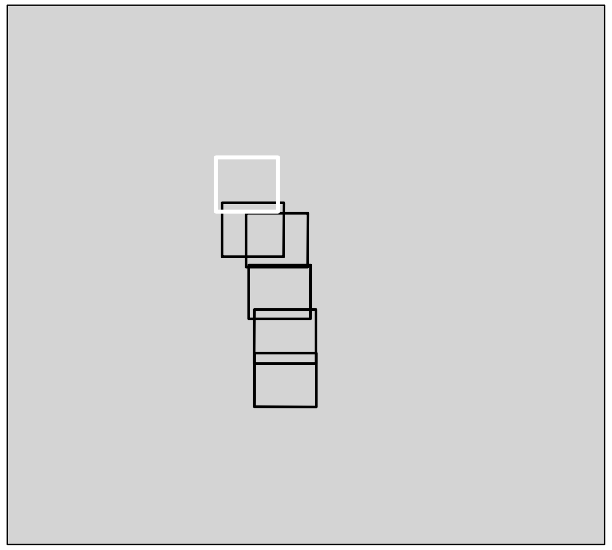

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¿âßÛäê

ÀÛéßÝäÛè

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ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
ííí à×ÙåØé Ûåã

Ìèåà ÛÙê

$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ Ðßêâ
ÂßÝëèÛ
¿¿½# Ÿ Áäìßèåäãåäê×â ¿åäéêè×ßäêé Ÿ ÀÛ
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'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

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ÀË ÊËÐ ÏÇ½ÈÁ

ÎÛì Ò

õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ Èßãßê
ÙåäêÛäêé åÜ êÞßé ÚåÙëãÛäê ×èÛ êÞÛ æèåæÛèêï åÜ Æ×ÙåØ
íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ×
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ÂÅÃÑÎÁ

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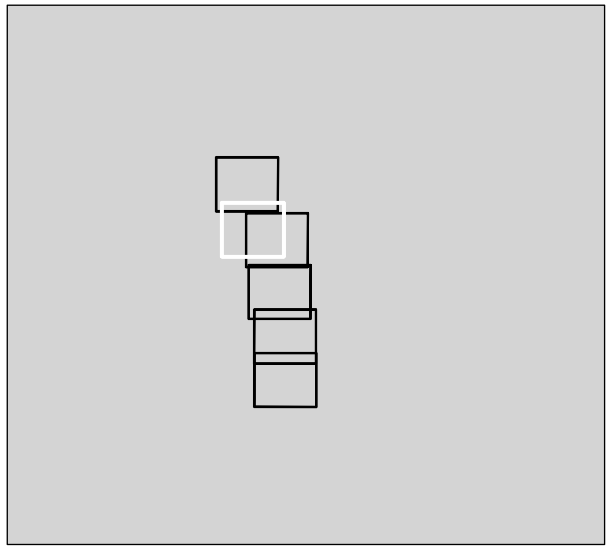

Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
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ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
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$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ Ðßêâû

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'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

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ÎÛì Ò

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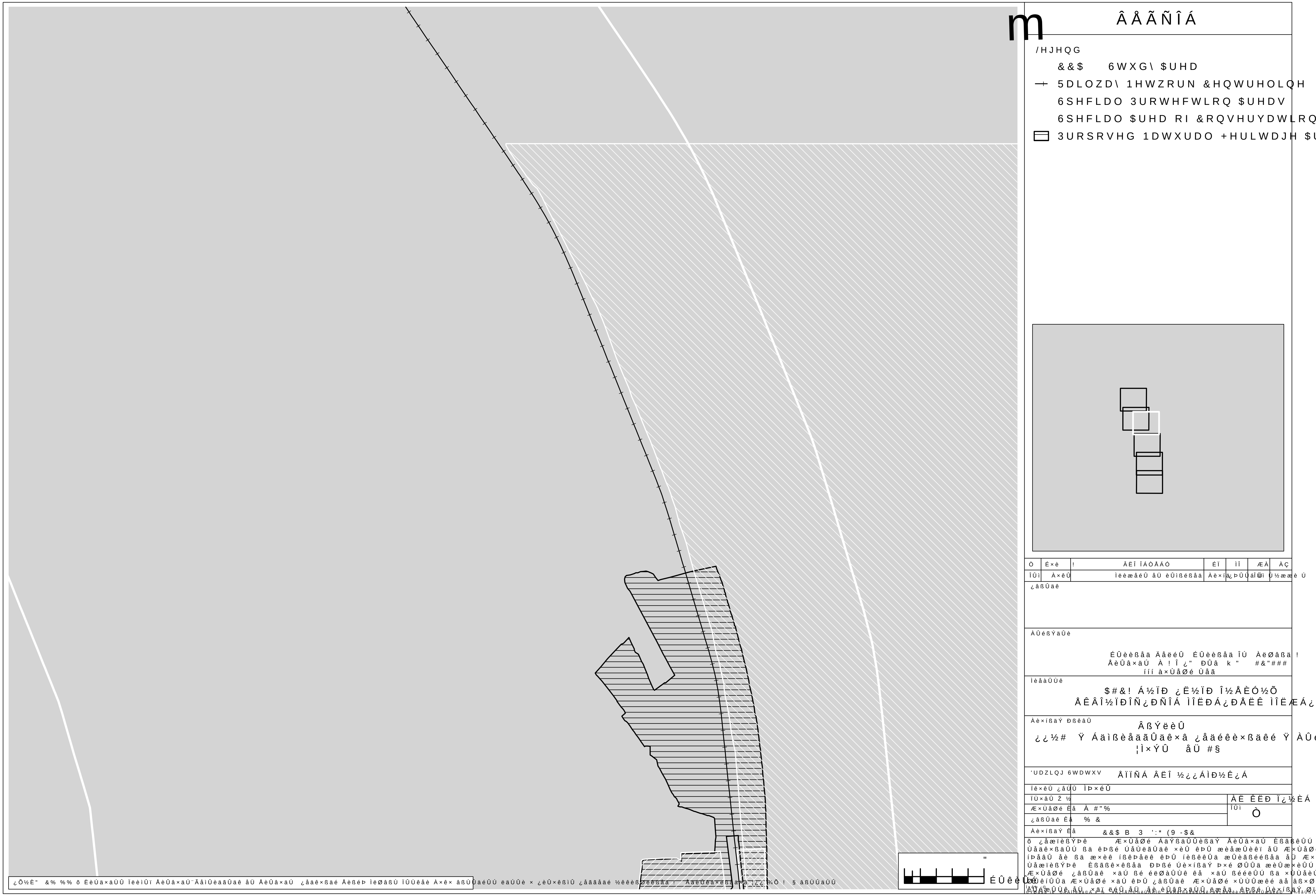
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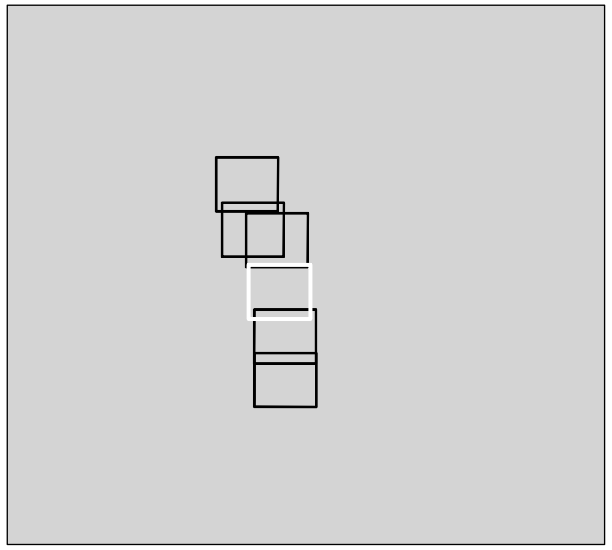

Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
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ííí à×ÙåØé Ùåã

ÌèåàÛÙê

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ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ ÐßêâÛ

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¦Ì×ÝÛ ! åÜ #§

'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

Ïê×êÛ ¿åÚÛ	ÌÞ×éÛ		
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õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ ÈßãßêÛÚ
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ÂÅÃÑÎÁ

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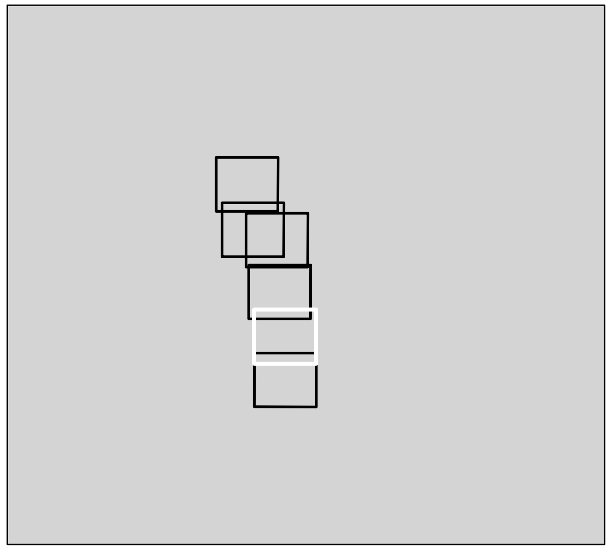
&&$ 6WXG\ $UHD

5DLOZD\ 1HWZRUN &HQWUHOLQH

6SHFLDO 3URWHFWLRQ $UHDV

6SHFLDO $UHD RI &RQVHUYDWLRQ

3URSRVHG 1DWXUDO +HULWDJH $U



Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
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Àè×íßäÝ ÐßêâÛ

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Ì×êÞ ©
©ÝØâåâ ìé ©ÂÅÏÎèåàÛÙê©À #"% ¥Á¿ÎÅÂ©½èÙÅÏ© &¥Áäìßèåäãäêâ¥¿åäéêè×ßäêé¥ÍÛæåéé© ¥¾ßåÚßìÛ

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ÉÛêèÛé

ÂÅÃÑÎÁ

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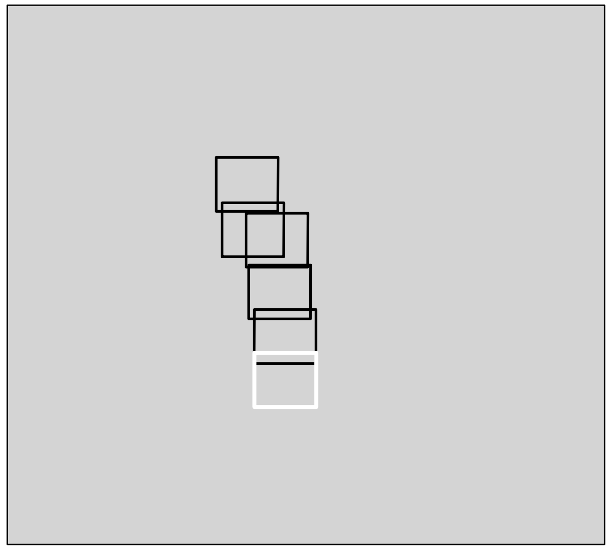
- &&$ 6WXG\ $UHD
- ⟞ 5DLOZD\ 1HWZRUN &HQWUHOLQH
- 6SHFLDO 3URWHFWLRQ $UHDV
- 6SHFLDO $UHD RI &RQVHUYDWLRQ
- ▭ 3URSRVHG 1DWXUDO +HULWDJH $U



Ò	É×è	!	ÂËÎ ÎÁÒÅÁÓ	ÉÏ	ÌÎ	ÆÀ	ÀÇ
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$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ Ðßêâ Û

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'UDZLQJ 6WDWXV ÅÏÏÑÁ ÂËÎ ½¿¿ÁÌÐ½Ê¿Á

Ïê×êÛ ¿åÚÛ	ÌÞ×éÛ		
ÏÙ×âÛ Ž ½		ÀË ÊËÐ Ï¿½ÈÁ	
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íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ×
ÙåæïèßÝÞê Èßãßê×êßåä ÐÞßé Úè×íßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ
Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßééëÛÚ ßä ×ÙÙåèÚ
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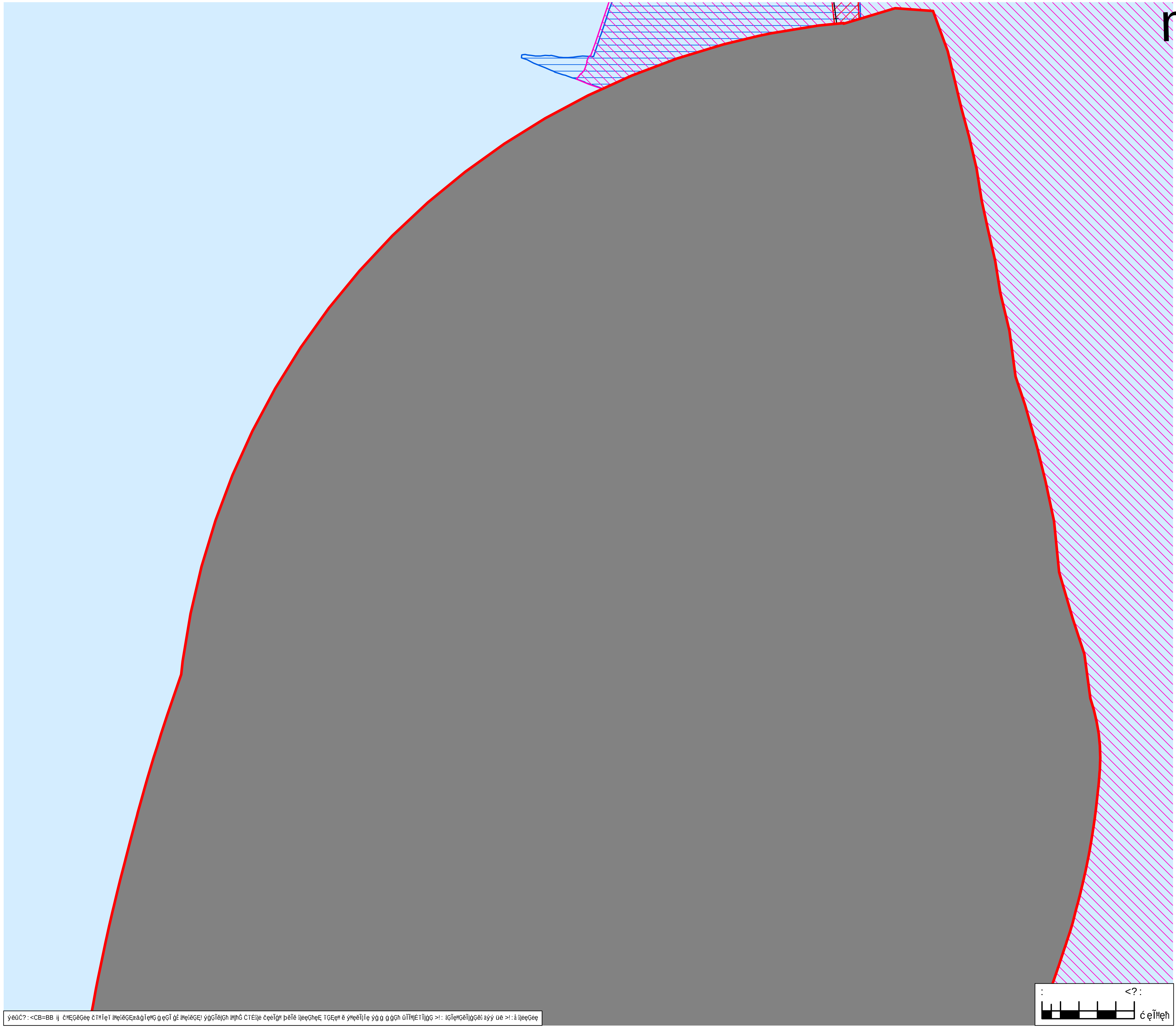
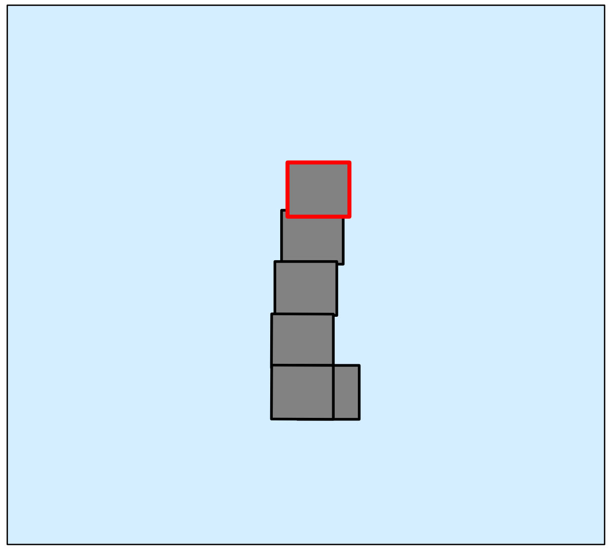


ÂÅÃÑÎÁ

/HJHQG

🟥	&&$ 6WXG\ $UHD
┼	5DLOZD\ 1HWZRUN &HQWUHOL
▨	6SHFLDO 3URWHFWLRQ $UHDV
▨	6SHFLDO $UHD RI &RQVHUYDW
▤	3URSRVHG 1DWXUDO +HULWDJ



'UDZLQJ 6WDWXV

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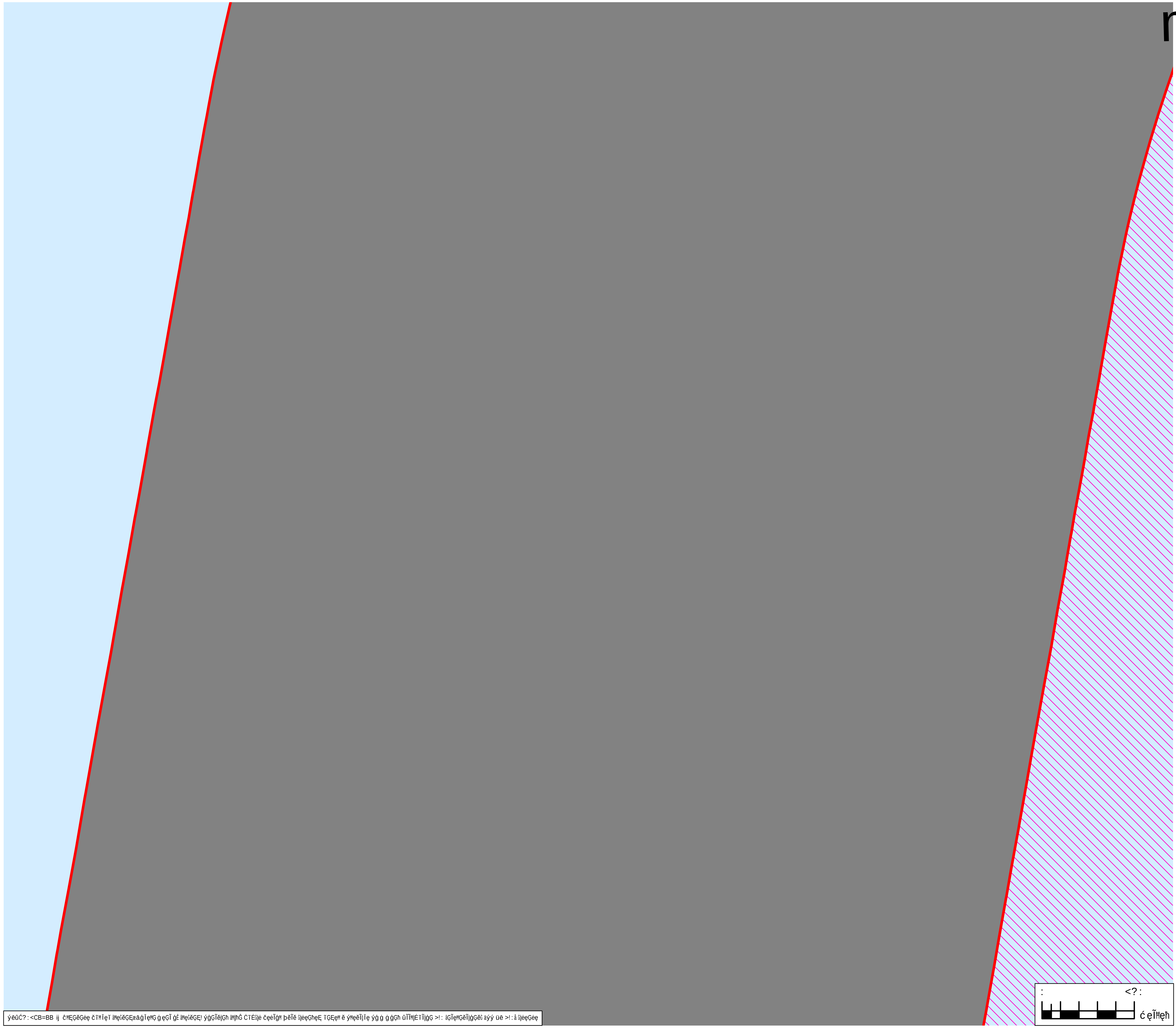

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ÂÅÃÑÎÁ

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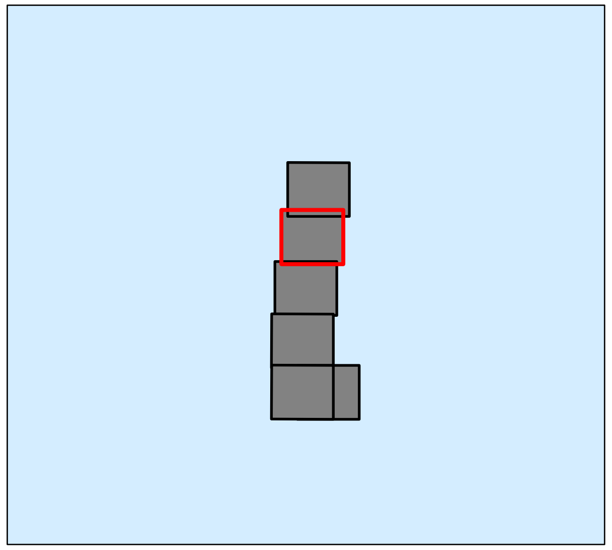
🟥	&&$ 6WXG\ $UHD
┼	5DLOZD\ 1HWZRUN &HQWUHOL
▨	6SHFLDO 3URWHFWLRQ $UHDV
▨	6SHFLDO $UHD RI &RQVHUYDW
▤	3URSRVHG 1DWXUDO +HULWDJ



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ýĝęĢĪ

þęħĝĕĢęĦ

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ăĦęĜĕĢĔ# þ:>Č<ý?! Ďęĝ" ©=?= ;<@C?@@@
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ĊĦģĝėĪ

A@C> ÿûčĎ ýĉûčĎ ČûăĆđûē
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þĦĕīĝĢĕ ĎĝĪĜę

Āĝĕīĭęĥ =!;!;
ýýû@!<Ý ÿĢĪĝĦģĢġ ęĢĪĕĜ ýģĢħĪĦĕĝĢĪħ Ý þęħĝĕĢĕĪęĔ ÿīĦģĤęĕĢ čĝĪęħ
ăČĕĕę < ģĔ @å

'UDZLQJ 6WDWXV ăččďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĪĕĪę ýģĔę	ĊĜĕħę <		
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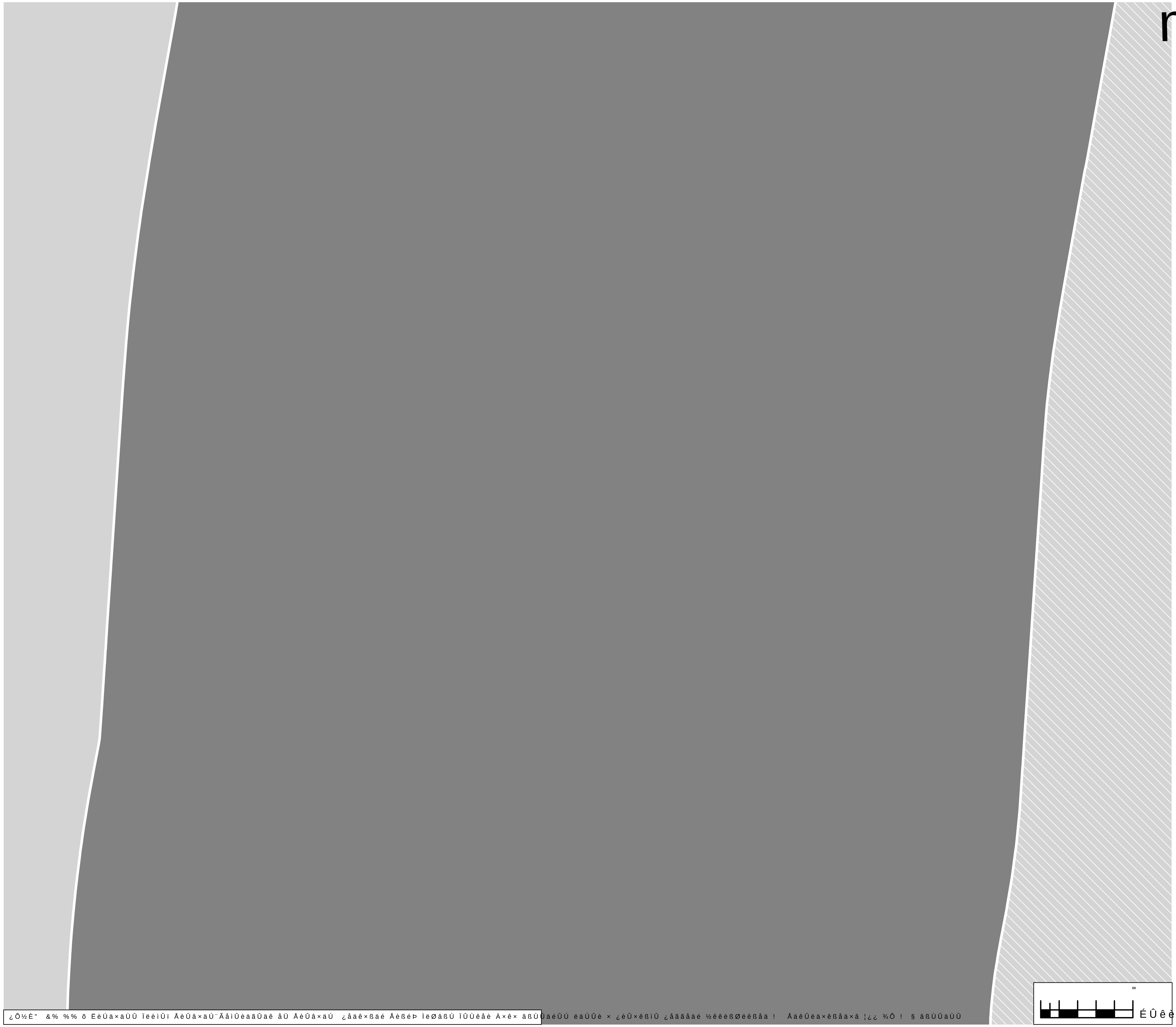
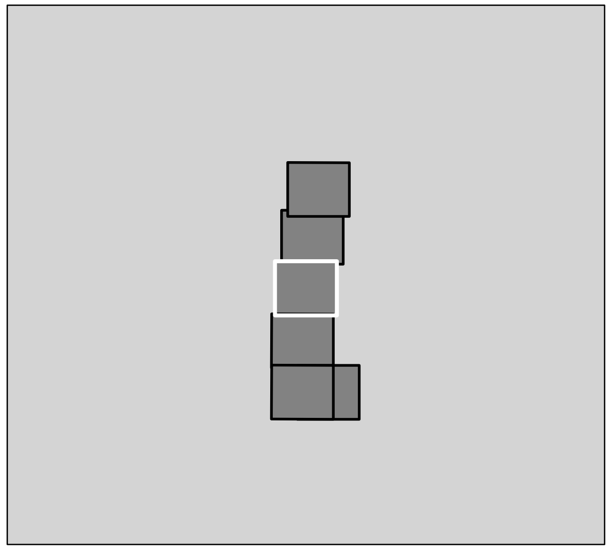


ÂÅÃÑÎÁ

/HJHQG

- ▇ &&$ 6WXG\ $UHD
- ─┼─ 5DLOZD\ 1HWZRUN &HQWUHOL
- 6SHFLDO 3URWHFWLRQ $UHDV
- 6SHFLDO $UHD RI &RQVHUYDW
- ▭ 3URSRVHG 1DWXUDO +HULWDJ



Ì	Æëä	ÂËÎ ÎÁÒÅÁÓ	ÈÂ	ÌÎ	ÆÀ	ÀÇ
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ÉÛèèßåä ÄåëéÛ ÉÛèèßåä ÎÚ ÀëØâßä !
ÅèÛâ×äÚ À ! Î ¿" ÐÛâ k " #&"###
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$#&! Á½ÏÐ ¿Ë½ÏÐ Î½ÅÈÓ½Õ
ÅÊÂÎ½ÏÐÎÑ¿ÐÑÎÁ ÌÎËÐÁ¿ÐÅËÊ ÌÎËÆÁ¿

Àè×íßäÝ ÐßêâÛ

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¿¿½# Ÿ Áäìßèåää ãÛäê×â ¿åäéêè×ßäêé Ÿ ÀÛ
¦Ì×ÝÛ åÜ #§

'UDZLQJ 6WDWXV ÀÎ½ÂÐ

Ïê×êÛ ¿åÚÛ	ÌÞ×éÛ	
ÏÙ×âÛ Ž ½		ÀË ÊËÐ Ï¿½ÈÁ
Æ×ÙåØé Êå	À #"%	ÎÛì Ì
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õ ¿åæïèßÝÞê Æ×ÙåØé ÁäÝßäÛÛèßäÝ ÅèÛâ×äÚ ÈßãßêÛÚ
ÙåäÊ×ßäÛÚ ßä êÞßé ÚåÙëãÛäê ×èÛ êÞÛ æèåæÛèêï åÜ Æ×ÙåØ
íÞåâÛ åè ßä æ×èê íßêÞåëê êÞÛ íèßêêÛä æÛèãßééßåä åÜ Æ×
ÙåæïèßÝÞê ÈßãßêÛêßåä ÐÞßé ÚÛ×íßäÝ Þ×é ØÛÛä æèÛæ×èÛÚ
Æ×ÙåØé ¿âßÛäê ×äÚ ßé éëØàÛÙê êå ×äÚ ßééëÛÚ ßä ×ÙÙåèÚ
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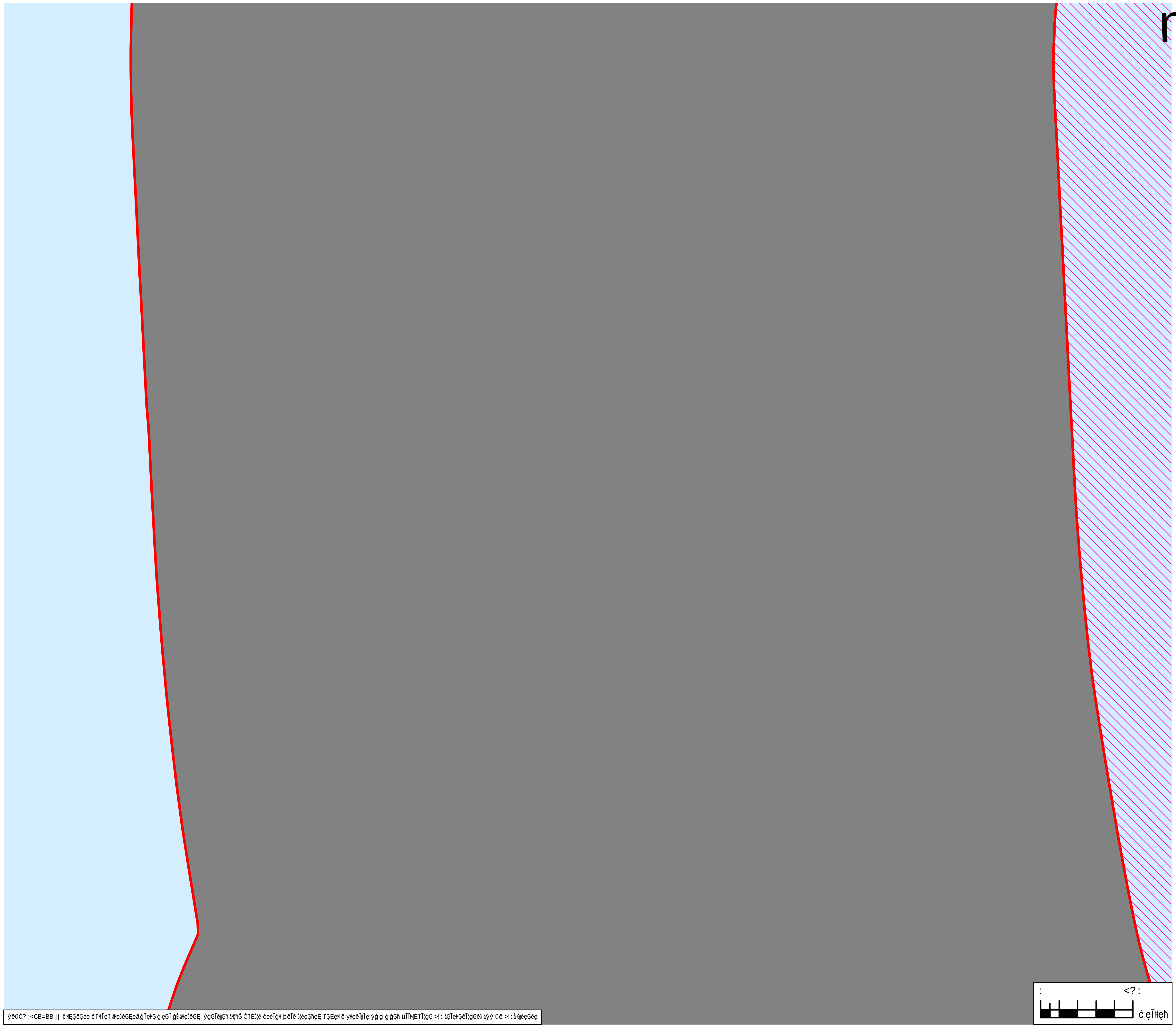
èÛéæÛÙê åÜ ×äï ëéÛ åÜ åè èÛâß×äÙÛ ëæåä êÞßé Àè×íßäÝ Øï
Ì×êÞ ©©ÝØâåä ìé ©Ýßéæèåà©À #"% ¥Á¿ÎÅÌÌ©½èÙÃÅÏ© &¥ÁäìßèåääãÛäê×â¥¿åäéêè×ßäêé¥ÎÛæåèê©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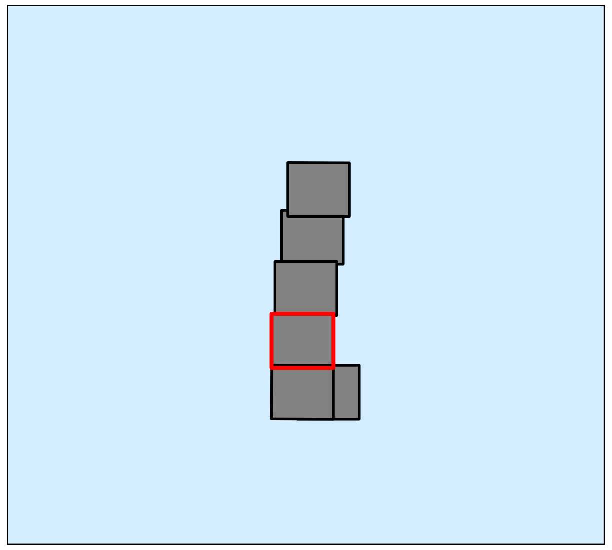

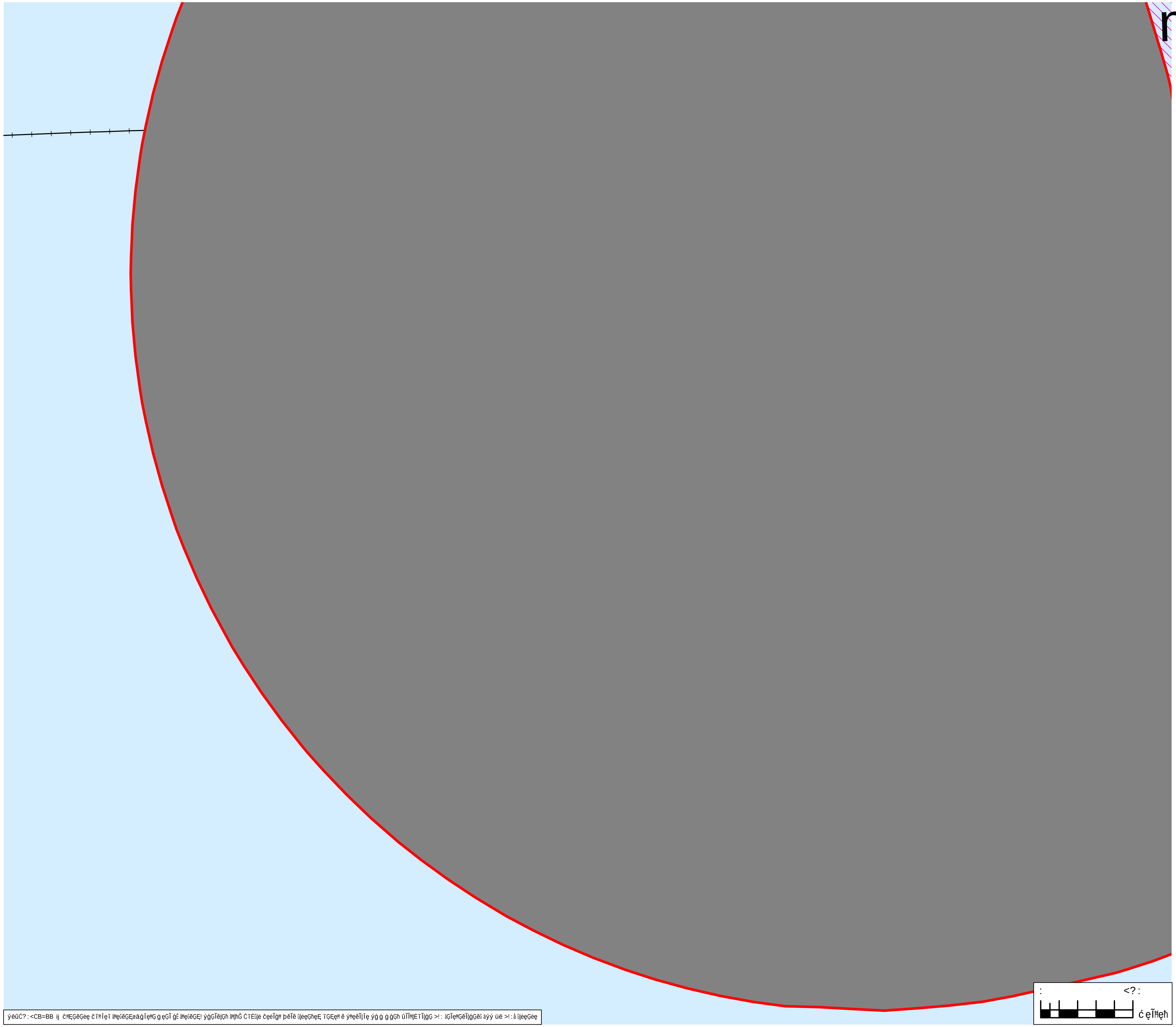

ÂÅÃÑÎÁ

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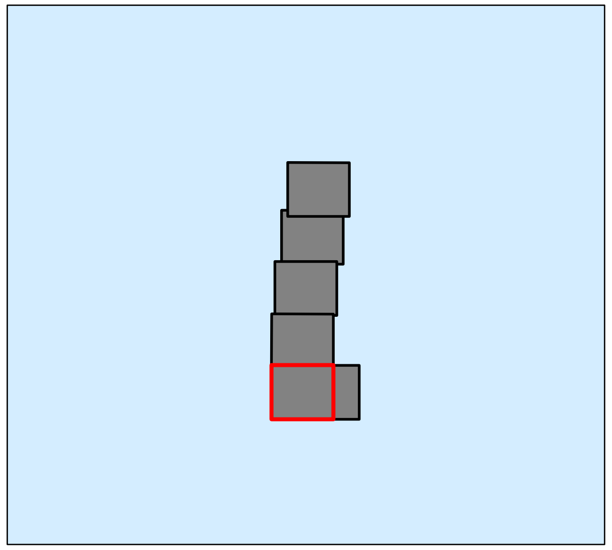
┼	5DLOZD\ 1HWZRUN &HQWUHOL
▨	6SHFLDO 3URWHFWLRQ $UHDV
▨	6SHFLDO $UHD RI &RQVHUYDW
▤	3URSRVHG 1DWXUDO +HULWDJ



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þĦĕĩġĢĕ ĎģĪĜę

Āģĕĩĩę =!;!;
ýýû@!<Ý ÿĢĪģĦġĢ ġ ęĢĪĕĠ ýġĢħĪĦĕģĢĪħ Ý þęħģĕĢĕĪęĘ ÿĩĦġĤęĕĢ čģĪęħ
äČĕĕę ? ġĚ @å

'UDZLQJ 6WDWXV ăččďÿ ĀĉČ ûýýÿĊĎûĈýÿ

čĪĕĪę ýġĘę	ĊĜĕħę <	
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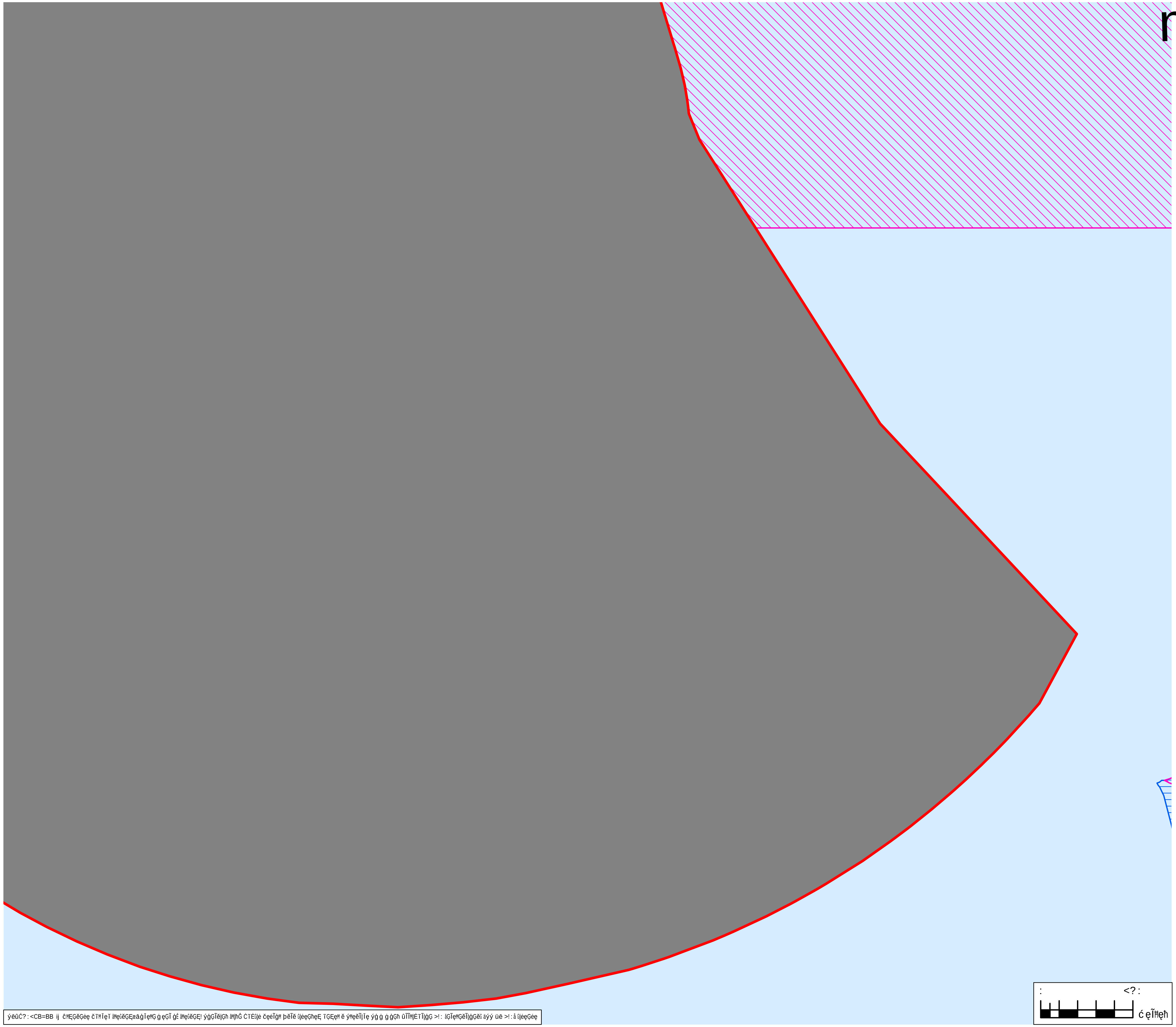

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